JAN 15 1924
Medical Lib

Virginia Medical Monthly

OFFICIAL ORGAN OF THE MEDICAL SOCIETY OF VIRGINIA

Vol. 50, No. 10.
WHOLE No. 859.

RICHMOND, VA., JANUARY, 1924

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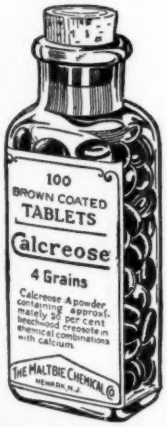

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Original Communications

THE PHYSIOLOGY OF THE PANCREAS, WITH SPECIAL REFERENCE TO THE PANCREATIC FUNCTION IN GENERAL METABOLISM.*

By THEODORE HOUGH, Ph. D., University, Virginia.

In view of the time which can reasonably be allowed for this paper, I have decided to limit myself to the physiology of the pancreas in the utilization of glucose in metabolism; and even in this field to attempt only to emphasize the more important points, with the special purpose in view of giving the setting of the discovery of insulin in the development of our knowledge of the general physiology of metabolism.

The discovery of insulin has not come upon us like a bolt out of the blue, as did that of the Roentgen rays or radio-activity. It is not even the crowning gift of a long line of physiological research; it is on the contrary, to change the figure, merely a milestone in the advance of knowledge; and, if I mistake not, its greatest ultimate benefit to the race lies, not in the introduction of a new therapeutic agent, but in that it gives us a new starting point for future investigation of some of the most obscure but most important problems of the metabolism of living cells.

THE DISCOVERY OF THE RELATION OF THE PANCREAS TO CARBOHYDRATE METABOLISM.

The memory of men of my own age goes back to the days when diabetes was simply a name given to a disease syndrome, one feature of which was the presence of glycosuria. It was known that this glycosuria is not of renal origin; also that the glycogenic function of the liver is impaired. Obviously carbohydrate metabolism was deranged but in what way it was deranged was not known—indeed on this subject there was the greatest variety of conflicting and irreconcilable opinion.

Important steps had been taken, however, in unravelling the tangle. The distinction was clearly recognized between the alimentary glycosuria following a candy spree and the glycosuria of diabetes which persists at times despite the complete exclusions of carbohydrates from the diet. Hyperglycemia was generally held to be the cause of glycosuria in both cases, although the existing methods of blood sugar analysis still excused, if they did not justify skepticism on this point.

Claude Bernard had not only demonstrated the glycogenic function of the liver but had also shown that acupuncture of a certain region of the bulb resulted in discharge of glycogen from the liver and glycosuria. These and other facts had been established but their synthesis into a satisfactory picture of carbohydrate metabolism awaited new discoveries.

Diabetes was suspected to be primarily a disease of the liver, or of the tissues generally. No suspicion was prevalent that deficient pancreatic function had anything to do with the trouble. After some preliminary announcements,* von Mering and Minkowski in 1890 and Minkowski in 1893 gave to the world the full account of their well-known experiments, showing that extirpation of the pancreas led to a severe and fatal diabetic condition; and that this was not due to the withdrawal of the digestive action of the pancreatic juice, since, on the one hand, it does not follow ligature of the pancreatic ducts and, on the other, does not occur so long as a comparatively small remnant of the pancreas with no ducts connecting with the intestine is left, but immediately develops upon the removal of this remnant.

Von Mering and Minkowski's results were immediately fully confirmed and Hedon added the important experiment of first transplanting in the subcutaneous tissue a lobe of the gland absolutely separated even from connective tissue connection with the intestine, but

*Read as part of the symposium on The Pancreas, at the fifty-fourth annual meeting of the Medical Society of Virginia in Roanoke, October 16-19, 1923.

*It shows how little the medical world of 1887-89 was prepared for this epoch-making discovery that the first announcement in the Centralblatt f. Klin. Medizin, 1889, x. p. 393 commands only a title reference with no abstract in the Centralbl. f. Physiologie for 1889.

still with its vascular supply intact. After the establishment of new vascular connections with the cutaneous circulation, the rest of the pancreas was removed. Diabetes did not develop, but immediately appeared upon removal of the transplant. Von Mering and Minkowski also demonstrated the presence of the acetone bodies in the urine of their depancreatized animals.

The question at once arose whether this "pancreatic diabetes" is identical with "diabetes mellitus." Clinicians and physiologists very properly continued to classify the two as separate conditions until their identity should be positively established. Nevertheless it was recognized that either the primary trouble in diabetes mellitus is deficient pancreatic function or else that the disease ultimately involves the pancreas and that most if not all the classical clinical manifestations—glycosuria, acetonuria, disturbed glycogenic function and the like—are the result of pancreatic involvement.

As one fact after another has been added to our knowledge in this field of metabolism, we may say at once that the identity of the two pictures has become more and more complete. We recall at once the contributions of Allen and his co-workers and of Joslin to this part of the subject.

The Function of the Islands of Langerhans.

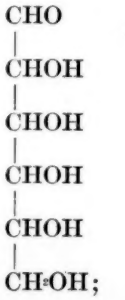
The next great landmark in the history of our subject is the work of Opie, strongly pointing to the Islands of Langerhans as the seat of the pancreatic function under discussion. Opie's original observations produced a large amount of controversial literature, the net result of which has been to leave little doubt that it is the islet cells and not the secreting acinar cells which are involved. The full discussion of this part of our subject, however, belongs in the field of pathology.

"The Fats Burn in the Fire of the Carbohydrates."

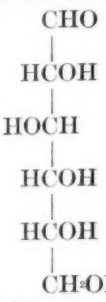
Meanwhile, the biological chemists had been accumulating facts which were ultimately to focus on the problems of normal and abnormal carbohydrate metabolism. The appearance of the acetone bodies in the urine of depancreatized animals was established by von Mering and Minkowski in 1890. Their significance was not understood, nor their relation to acidosis, a conception which came into physiological thinking only during the first decade of this century. Nevertheless the association of acetonuria (ketonuria) with failure of the organism to utilize glucose came to be firmly established and proved to be of wider occurrence than in the diabetic condition. The work of Lusk and his co-workers between 1898 and 1905 on phlorhizin glycosuria revealed a condition in which the blood sugar is rapidly drained off, as it were, through the kidneys and ceases to be available in general metabolism. This condition was likewise accompanied by acetonuria and gave perhaps the first glimpse of the truth that fat metabolism is in some way closely associated with carbohydrate metabolism—that "the fats burn in the fire of the carbohydrates"; or, to be more exact, certain of the intermediate products of the oxidation of fats burn or burn readily only in the fire of the carbohydrates. This is especially true of beta-hydroxy-butyric and aceto-acetic (beta-keto-butyric) acids. The formation of acetone from aceto-acetic acid by the well-known biochemical process of decarboxylization gave a satisfactory explanation of the association of these three compounds in diabetic urine.

The Glucose Molecule is Labile and Reactive.

Those in my audience whose first acquaintance with biochemistry goes back no more than twenty years probably learned as students, no more of the structure of glucose than that it has the formula $C_6H_{12}O_6$; some few may have gone further, if their text-books and instructors were at all up to date, and learned that the structural formula is:



A favored and fortunate few may have learned that the stereoisomeric structure is:



All this was quite true but it did not go far enough, for it left upon the mind the incorrect impression that glucose is always this hard and fast arrangement of carbon, hydrogen, and oxygen atoms, no matter whether in the solid form, or dissolved in water, or in the presence of weak acids or bases, or even in the living cells of the body.

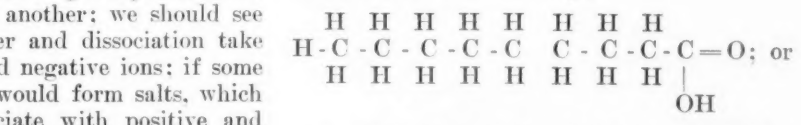
We now know that when glucose goes into solution the atoms of its molecule undergo numerous reversible rearrangements and that the form which these rearrangements take depends on various physical and chemical conditions of the solution. The hard and fast glucose molecule of our student days existed chiefly in our minds; in nature and especially in living nature it is an extremely reactive molecule. If we could see the glucose molecules undergoing their changes of shape and structure in an aqueous solution, the solution would probably remind us of the old rain barrel teeming with mosquito larvae. We should see straight chains form ring compounds, first of one kind, then of another; we should see them react with water and dissociation take place into positive and negative ions: if some base is present, they would form salts, which in turn would dissociate with positive and negative electric charges on the opposite ions; rise of temperature would produce other changes with resulting possibilities of chemical synthesis or disintegration; most important of all, some of these isomeric forms are much more reactive to oxygen or other substances than other forms. Sugar is a food because it acts in this way as a labile molecule in the solvent of the body fluids, and it may be utilized only as it undergoes certain of these changes.

The most accomplished organic and physiological chemists are just beginning to understand the behavior of a glucose molecule and to apply their knowledge to its metabolic performance. Enough is known to make us strongly suspect that, to take part in the oxidative changes which ultimately lead to carbon dioxide and water, the glucose molecule must first pass into one or more of these isomeric forms and possibly unite with other molescules —carbohydrate or protein—before the attack of oxygen or of other agents upon it is successful.

There can be little doubt that the active substance in our insulin extracts plays an essential role in this preparation of the glucose molecule for its metabolic activity. To the physiologist insulin settles the formerly disputed question whether the pancreas provides a material which—discharged into the blood, carried to the living cells, and absorbed by them—enables them to utilize sugar; or whether it exerts some sort of a "detoxicating" influence, removing from the blood some poison which prevents the utilization of sugar by the body. Insulin answers this question in favor of the first explanation just as thyroxin and the prophylactic and therapeutic administration of iodine in goitre answer a similar question in the physiology of the thyroid gland.

Beta-Oxidation of Fats and Fatty Acids.

Biological chemists have also thrown much light on the oxidation of fats, or (what amounts to the same thing) the oxidation of fatty acids. A fatty acid molecule presents a chain of carbon atoms: e. g.,



$CH_3\ CH_2\ CH_2\ CH_2\ CH_2 \quad CH_2\ CH_2\ CH_2\ COOH$

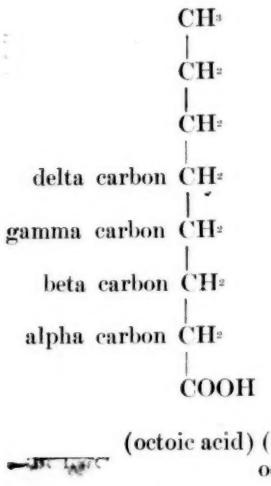
Most of the food fats show a long chain: e. g.,

Palmitic acid: $CH_3.\ (CH_2)_{14}.\ COOH$
Stearic acid: $CH_3.\ (CH_2)_{16}.\ COOH$, etc;

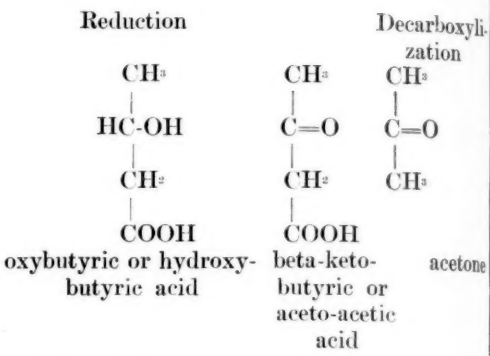
and one of the most striking things about the fatty acids of the *natural* fats, both of plants and of animals, (and this includes virtually all the food fats), is that they have an *even* number of carbon atoms. Fatty acids with an odd number of carbon atoms can be produced in the chemical laboratory, and several of the

amino-acids whose combination makes the protein molecule are substituted fats of an odd number of carbon atoms; but the natural fats are practically without exception esters of fatty acids of an even number of carbons.

This interesting "find" of the "pure scientist" has a most important bearing upon the occurrence of acetonuria and acidosis in all conditions (including diabetes) when sugar is not burned properly in the body. When oxygen attacks a fatty acid, it usually if not always unites with what we call the beta-carbon atom, i. e., the second carbon atom from the COOH, or carboxyl group, thus:



In the chemical laboratory oxygen may attack other carbons, and probably it may do so at times in the body; but generally it attacks the beta-carbon. The long carbon chain then breaks at the point of oxygen attack with the formation of acetic acid and an acid with two less carbons than the one we started with. The acetic acid is readily oxidized to carbon dioxide and water. The hexoic acid, in the above case, would next be attacked in the same manner on its beta-carbon, giving us the 4 carbon acid, namely butyric acid. This is likewise attacked, giving beta-keto-butyric acid (or aceto-acetic acid). We should expect this to break up into two molecules of acetic acid; but for some reason this last step is taken only in the presence of "active" glucose; i. e., that isomeric form of glucose which enters into the oxidative metabolism. Instead thereof in the diabetic body the aceto-acetic acid may undergo two changes, as follows:



It is for these reasons that these three compounds are associated in the urine of diabetics.

Acidosis a Concomitant of Ketonuria.

The body, therefore, with impaired power of oxidizing sugar, is also unable to complete the oxidation of fats. Apparently it carries through the process of beta-oxidation quite successfully until the final stages are reached. Considerable energy is furnished the body in this process, but at the expense of the production and accumulation of enough of the relatively strong oxy-butyric and beta-keto-butyric (aceto-acetic) acids to draw too heavily on the alkali reserve and thus produce the condition of acidosis.

Insulin clears up both glycosuria and ketonuria (acteonuria) primarily by making it possible for sugar to burn and, in consequence of this burning, making it possible for these products of fat oxidation to "burn in the fire of the carbohydrates" just as they do in the normal body. The end products of this final normal step in the oxidation of fats, carbon dioxide and water, are promptly excreted, thus avoiding acidosis.

The Substitution of Odd Carbon Synthetic Fat For Even Carbon Natural Fat in Diabetic Feeding.

Mention should be made in this connection of another promising attempt to facilitate the feeding of diabetics so as to avoid acidosis. If we could feed fats whose fatty acids contain an *odd* number of carbon atoms, beta-oxidation would occur; but this would bring us to the three-carbon acid, proprionic acid, which is readily cared for by oxidation or by synthesis into sugar. We thus escape the pitfall of aceto-acetic acid. As already pointed out, the natural fatty acids of our fatty food all contain an even number of carbons. Chemists have pre-

pared the odd-carbon acids, but until recently only at prohibitive expense as a source of food. Recently Prof. R. H. McKee of Columbia Univeristy has succeeded in preparing on a commercial scale a fat whose fatty acid contains an odd number of carbon atoms. The cost of this fat at present is $8.00—$9.00 a pound; it is palatable and seems to serve in metabolism the same purpose as the naturally occurring fats. A manufacturing plant has been erected at Long Island City to make this product, known as Intarvin, for use in diabetic feeding.

When one remembers that the chief problem of diabetic feeding is to supply enough energy to the body after the usual chief source —the oxidation of glucose—is impaired or destroyed and, in consequence, fats cannot be used abundantly because of the danger of acidosis, the importance of having an odd carbon fatty acid in diabetic feeding is obvious.

The Physiological Setting of Insulin.

This paper makes no pretence of summarizing the literature of the physiology of insulin or of diabetes. This literature has accumulated with feverish rapidity during the past year. Fortunately, journals like the *Journal of the American Medical Association* keep the medical profession so well informed of progress that even "he who runs may read." I shall merely conclude with a brief glance at several points which will perhaps assist the general practitioner to get the physiological setting of these discoveries.

1. *What is insulin from the standpoint of chemical structure?* We recall the light thrown on adrenal function by Abel's demonstration of the structure of epinephrin and the light thrown on thyroid function and therapy by Kendall's demonstration of the structure of thyroxin, both these discoveries holding out the prospect of synthetic preparation of these internal secretions. Have we any similar knowledge of the chemical structure of insulin? We have not. We do not even know that it is a single compound. It is known to be destroyed by pepsin and trypsin (and hence cannot be administered *per os*) and this strongly suggests that it is a protein or peptide combination, or combinations, probably of considerable complexity. If this surmise should be confirmed, the prospect of synthetic preparation is not hopeful.

2. *Widespread occurrence of insulin-like substances in plants and animals.*—On the other hand, glucose is a food of all animals and of most plants. The green plant makes it with the aid of sunlight from carbon dioxide and water; the mold grows actively upon material containing it; the action of yeast on it is well known; and the occurrence of dextrose and glycogen is all but universal in the animal kingdom. If the mammalian body requires a special agent to make the glucose of its food available, we should expect to find it or some similar substance in plants and animals generally. This expectation is being realized in that Willaman has prepared from green plants and Collip from yeast an extract which lowers the blood sugar in diabetic animals. This suggests that insulin, or something performing the same general function as insulin, is widely distributed, a part of the mechanism, as it were, of most and possibly of all living organisms; and that in the higher animals this function has been segregated in the islet cells.

3. *Seat of action of insulin.*—Where does insulin act? In the blood, or in the cell?—for it would seem clear that it acts in the one or the other or both. Its addition to drawn blood has not, in the experiments made to test this point, increased the rate of disappearance of sugar (glycolysis) from the blood; on the other hand, it causes sugar to disappear much more rapidly from the fluid used in perfusing an isolated beating heart. These experiments strongly suggest that the seat of action of insulin is the cell itself, but they do not disprove the possibility that insulin may play its role in part or in whole in the blood. Glycolysis merely means that sugar has disappeared in the form which will give the reaction upon which the quantitative test is based. Its non-occurrence does not prove that the sugar has not been changed in internal structure, perhaps into a more reactive isomer, which still gives the reducing test; and it may be—for all the conclusive experimental evidence that I know to the contrary—that insulin acts upon the sugar in the blood, making it more reactive, and that this more reactive form of glucose enters the cell, there to be immediately oxidized.

4. *Regulation of the pancreatic manufacture and secretion of insulin.*—The extraction of insulin and the rough estimates we are al-

ready able to make of its amount in different organs, or in the same organ at different times, would also seem to give us a method of attacking the problem of the physiological adjustments of the pancreatic functions to the varying needs of carbohydrate metabolism in the organism as a whole. Virtually nothing is known on this subject today. Does the normal pancreas maintain a steady secretion of insulin into the blood or is its rate of manufacture or secretion or both adjusted to the existing needs of the organism? Here again we recall the history of adrenalin,—at first thought to be steadily secreted at a more or less uniform rate into the blood until shown to be under the control of the nervous system and secreted when occasion demands the more vigorous action of the reaction organs of the sympathetic fibers. With regard to this part of the physiology of the pancreas we are in the same stage of knowledge as we were with regard to the adrenals in 1895 and doubtless it will take long and careful investigation to answer the important physiological questions which crowd upon us. I merely desire to show you that the discovery of insulin gives us a new point of attack upon this field of physiology.

5. *The hypoglycemic reaction.* — To the physiologist and the student of metabolism probably the most important new revelation which has come to us as the result of the work with insulin is the hypoglycemic reaction consequent upon an overdose. So far as I know, this is a new discovery in the field of carbohydrate metabolism and a fact of deep significance, which demands immediate and intensive study. Going back to the days when Liebig dominated thought on metabolism, we recall his classification of foods into "plastic" and "respiratory," the former (proteins) providing material for tissue building and the energy for muscular work; the latter (fats and carbohydrates) serving no other function than the liberation of heat through oxidation. We recall the classical experiment of Fick and Wislicenus, which overthrew this theory of the Czar of chemistry as effectively as Pasteur overthrew his theory of fermentation and showed that the oxidation of fats and carbohydrates yields energy for muscular work as well as heat to maintain the constant body temperature. Later it was shown that the energy for muscular work could come ultimately from protein or fat or carbohydrate; but vestigial survivals of the old Liebig classification remain today in a very generally held point of view that the only function of fats and carbohydrates is to be burned either to do work or produce heat and it is largely immaterial whether fat or carbohydrate is used for this purpose. In other words, the fats and the carbohydrates play essentially the same role in metabolism.

Biochemistry has meanwhile accumulated facts which raise doubts as to the correctness of this point of view. For example, it is known that the cerebrins—a group of lipoid constituents of many cells—contain galactose in the molecule; also that the nucleic acids contain pentose or hexose radicles and that probably the hexose radicle is glucose. Obviously galactose and glucose are building stones of important chemical compounds. The development of lipoid chemistry has pointed to a similar function of fatty acid in the synthesis of other compounds.

Now comes the physiological and clinical observation that reduction of the blood sugar below a certain level is fatal; that, as this level is approached, certain important symptoms make their appearance, among them being a "rapid pulse rate (but a slow rate when the reaction is severe), pallor, sweating, stupor, peculiar feelings of impending danger, incoherence in speech, tremulousness, and finally coma and convulsions" (Seale Harris). Finally, all these symptoms are relieved promptly by increasing the blood sugar.

I can only make the wildest guesses at the physiological genesis of these symptoms; but I can see that they open up a new field of extensive investigation into many of the fundamental problems of metabolism. It would seem that the combination of insulin and odd-carbon fat in feeding normal and depancreatized animals gives us the means of studying the role of carbohydrates without the complication of ketonuria and acidosis. Hitherto, by the use of insulin, we could reduce the blood sugar to very low figures (0.03—0.04 per cent) but the picture of the effects of sugar deficiency in metabolism was blurred or completely obliterated by the resulting acidosis. It would seem that we should now be able to meet the energy needs of the body for comparatively long periods of time with odd-carbon fat and thus be in a position to see how metabolism in particular and the bodily functions in general are

influenced by deprivation of one of the usual foods. The combination of odd-carbon fat and phlorhizin poisoning holds out similar alluring prospects, which only actual research, and I doubt not an immense amount of most painstaking, critical research, can make our own; but it is one of the most important problems for immediate attack.

Physiologists have long suspected that the two sole sources of energy for muscular work may be glucose and fat. Protein food, it is true, may also serve as the ultimate source of energy for muscular work; but this may be only in virtue of the amino-acids of which it is composed and into which it is broken down in the alimentary canal; these amino-acids, after absorption into the body and deamination (removal of their ammonia radicle), give us sugar and fatty acids; and it may be that it is only this part of the protein molecule which serves as the source of energy for muscle work. Insulin may yet reveal to us the real chemistry of muscular contraction.

But these are more dreams of an enthusiastic physiologist, at least for the present. May I close this paper with a plea for the importance, the fundamental importance, the all-importance of pure science in the progress of medicine and the unstinted recognition of this in the form of public and professional support? It is certainly with no desire to detract one iota from the justly earned recognition of men like Banting, Macleod, Collip, and their co-workers that I remark that an almost painful lack of appreciation of true relative values is shown in the fact that the isolation of insulin and the working out of its therapeutic application has brought to the men who have done this work—and done it so well—far more public recognition than ever fell to the lot of von Mering and Minkowski, of Opie, of Graham Lusk, of Dakin, or even to that prince of pioneer investigators, Claude Bernard, who have made contributions of equal merit and some of greater importance to the physiology of carbohydrate metabolism but whose great discoveries did not at once find application in the practice of medicine. I do not begrudge the recognition which has come to Banting and Macleod. They richly deserve it. Nor do I find fault with the lack of popular recognition of the pure scientists whose work has helped to lay the foundations of our knowledge and our practice. This is inevitable in the nature of the case. One hundred years from now all this will matter nothing whatever. I do insist, however, that the work of von Mering and Minkowski, of Lusk, and the rest is as important to us today as that of the Canadian investigators; and that without the former we should not only not have the latter, but we would not know what to do with insulin if it came to us as a gift by some sort of direct inspiration; and I insist upon this, not for a moment to plead for similar popular, personal recognition of the results of purely scientific investigation in the field of medicine —for this I do not "care a fig;"—I do it to emphasize the all important character of "pure science" in medicine and to urge that you do all in your power to increase public support of this work in our medical schools and research institutes. Every great advance in practice has come from the increase of insight, through patient, accurate, truth-seeking and generally long continued investigation into the pure science of the phenomena of living things with which we deal.

THE PATHOLOGY OF THE PANCREAS.*

By K. D. GRAVES, M. D., Roanoke, Va.

The pancreas is subject to a number of pathological changes, such as abscess, calculi in ducts, carcinoma, adenoma, sarcoma, inflammation, hemorrhage, syphilis and tuberculosis; but, owing to the limited scope of this symposium, I shall limit myself to a discussion of the changes which take place in it incident to the disease known as diabetes mellitus.

A great deal of work has been done, and many theories advanced as to the function and importance of the internal secretion of the pancreas. Mering and Minkowski in 1889 showed that extirpation of the entire pancreas led to the familiar train of symptoms of diabetes mellitus. Opie in 1900, and later Schaefer and Ssobolew, called attention to the islands of Langerhans in connection with diabetes, and maintained that the active portion of the pancreas in preventing diabetes was to be found in them; and MacCallum in 1909 and Kirkbride in 1912 performed a most interesting experiment which was as follows: Half the pancreas of a living animal was ligated, and the animal survived; a year later the animal

*Read as a part of the symposium on The Pancreas, at the fifty-fourth annual meeting of the Medical Society of Virginia, in Roanoke, October 16-19, 1923.

showed the transformation of the ligated portion into a thin transparent film in the mesentery. Extirpation of the normal half of the pancreas was followed by a transient glycosuria, from which the animal survived and recovered; but after the extirpation of the thin film which represented the other half of the pancreas, the animal developed severe diabetes; this film contained only islands of Langerhans.

Surprisingly few cases of diabetes have been found which show gross changes in the pancreas; but, as has been mentioned above, the majority show microscopic changes of one sort or another, either in the number of islands or their microscopic appearance. Weichselbaum and Heiberg emphasized the importance of the islands, the former the qualitative, and the latter the quantitative; Allen lays stress on hydropic degeneration as an end result, and fibrosis and chronic pancreatitis as evidence of functional impairment; Conroy considers that both quantitative and qualitative changes are operative, laying emphasis on hyalinization and fibrosis of the insular tissue. Cecil found pathological changes in the pancreas in 87% of his diabetetic cases.

I have cited the above opinions and conclusions chiefly to show their divergence. It is, in the light of our present knowledge, manifestly impossible to say didactically by gross or microscopic examination, that a certain patient had diabetes; we may say that we find certain conditions which strongly suggest the disease, but here our report must end. If, after such exhaustive efforts as have been made to correlate the visible picture of the organ with diabetes, we must confess our inability definitely to diagnose the disease by a study of the pancreas, we must feel fairly safe in assuming that further light on the characteristic changes which take place in the pancreas will probably come, not through further microscopic study, but by some other avenue of approach, such as possibly a biochemical reaction, as we have with adrenalin; or a biophysical reaction, as we have with the electrocardiograph; or some other equally remote, but equally possible means of detecting deviation from normal.

In conclusion, may I reiterate that, although years of exhaustive study have been spent by the leaders in pathological thought, in their effort to correlate microscopic changes in the pancreas with symptoms of the disease in the human organism, there is still a wide divergence of opinion, apparently indicating that they have not yet solved the problem; but that, with the momentous and epoch-making discovery of Banting and his associates, a new era has been ushered in, which promises hope to the diabetic patient, and encouragement to the student of the subject.

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DIAGNOSIS AND MEDICAL ASPECTS OF DISEASES OF THE PANCREAS.*

By JAMES H. SMITH, M. D., Richmond, Va.

How can we recognize disease of the pancreas? What is the lesion? What are the broader indications as to treatment? These I conceive to be the questions embraced in my subject.

An anatomical and functional isolation of the isles of Langerhans tends to hold in disease as in the normal. When advanced stages have been reached in acinar or interacinar lesions, carbohydrate metabolism may be impaired—sometimes, ineed, early; but we do well not to rely upon these two parts of the gland for evidence incriminating each other. Disease affecting the external secretion will be first considered.

Because the external secretion splits fats, proteins and carbohydrates, diagnostic evidence may be furnished by failure of either of these classes of foods to be digested, or by a lessened content of the respective enzymes in the fæces. Steatorrhea is the name given to the passage of stools containing liquid fat, solidifying on cooling. While it points directly at the pancreas, its occurrence is rare. Significance almost as great is attached to the chemical determination of more than fifty per cent of fat unsplit. Lesser percentages may be due to other causes. The not uncommon clay or putty colored stool may be due to pancreatic deficiency, or, as the term "acholic" indicates, to biliary obstruction, or to some process such as peritoneal or mesenteric tuberculosis, which interferes with intestinal absorption.

The presence in the fæces of undigested striped muscle is indicative of pancreatic rather than hepatic disease. But it may result from any condition in which the intestinal contents pass rapidly through the bowel. It has been termed creatorrhea.

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Failure of the starch-splitting ferment to reach the intestine is evidenced by a shortage of disastase in the fæces, and an excess in the blood and urine. The two latter are of value when the kidney function is not impaired. I will not quote the technical details of this and other special tests; I have had no experience with them except through pathologists. The Cammidge reaction has never come into general use, and its value is doubtful. There is a series of so-called "messenger" tests, consisting of passing various substances through the bowel to see what happens to them. Einhorn's method of obtaining duodenal contents for examination of its tryptic activity was a forerunner of Lyon's method for study of the biliary secretion. Beyond question, we need something that will furnish direct evidence of disease of the pancreas, but it can hardly be said that any one of these tests has, so far, proved uniformly reliable.

To return to the data to be had at the bedside; the typical stool in disease of the pancreas is bulky, pale, soft, gaseous, offensive, high in fat content, and may contain undigested muscle fibres. This will be recognized as quite the same description applying to the stools in sprue, though it does not constitute the diagnosis of sprue. Glandular insufficiency involving the pancreas, liver, intestinal glands, and often the stomach may develop in sprue or other wasting constitutional disease, such as pernicious anaemia or pellagra. The tongue is often a good index of such a deficiency. Ashford[1] claims that true tropical sprue results only when there is superimposed upon glandular insufficiency, colonization in the digestive tract of a specific organism, *monilia psilosis*. Others have attempted to treat sprue specifically with vaccines made from this organism.[2] Probably the etiology of sprue should be regarded as unsettled.

In conditions in which pancreatic secretion is deficient, beneficial effects have been reported from the administration of fresh pancreatic substance. Several careful investigators have testified to a potency of commercially prepared pancreatic extracts. Such products from reputable makers are useful remedies, and it is preferable to get a clean preparation from a drug store rather than something to be eaten raw from a butcher. Selection should be made with a view to the ferment or ferments most needed. In a case of severe, prolonged secondary anaemia due to hemorrhoids, with stools of the character described, I attributed much benefit to pancreatic extracts. An American physician, returned from Korea, stated that sprue is common in that country, that he had treated many cases, and was convinced that he himself was suffering from that disease. He improved under pancreatic extract along with diet and the chance to recuperate from fatigue and worry in a difficult environment. Thomas Brown[3] reports five cases of sprue in which he established the fact of pancreatic insufficiency. Four showed remarkable improvement from the administration of pancreatin, which is a preparation of trypsin. A large number of minor illnesses, and a symptom-group arising in various diseases, situations in which we often prescribe calomel, flatulent indigestion and the like may be contributed to by a pancreatic fault, as much as by biliary derangement. This is the state referred to by Garrod[4], in which the pancreas is only "worried," rather than diseased. In my experience, pancreatic preparations are more effectual in relieving such complaints than are the bile salts. After all, the bile salts are adjuvant only to the pancreatic lipase.

The intimate relationships, both anatomical and functional, between the liver and the pancreas at times make differential diagnosis almost impossible. The pancreatic duct comes into direct relation with the common bile duct at the diverticulum of Vater, and the head of the pancreas lies in close apposition. Thus, the fat-splitting function of both secretions may be interfered with by a single calculus; progressive jaundice and enlarged gall-bladder —Courvoisier's law—are as characteristic of cancer of the head of the pancreas as of the bile-ducts; and inflammation traveling along the ducts may result in acute or chronic pancreatitis as a complication or sequel of bile-tract infection. Most of us keep pretty well in mind the liver as a source of abdominal trouble. Whenever we suspect the liver, we should consider the pancreas; roentgen-ray study may help to locate the lesion. As the same measures of treatment, chiefly surgical, are applied to both in the present state of our

1. Ashford, Bailey K., Am. Jour. Med. Sci., 165, 2, 157.
2. Rogers, J. M., Jour Am. Med. Assn., 79, 20, 1677.
3. Brown, Thomas R., Am Jour. Med. Sci., CLXI, 501.
4. Garrod, Archibald E., The Lancet, Apr. 3, 1920.

knowledge, no very vital issues usually are at stake. As between drainage and removal of the gall-bladder, perhaps the pancreatitis at times associated with cholecystitis deserves special consideration. This, however, is a surgical question. When we think of these two extensive systems of ducts, and the organs to which they lead, it is not difficult to understand why gall-bladder operations often fail to give the permanent relief hoped for.

When the pancreas becomes the seat of acute hemorrhagic inflammation, the clinical picture most nearly approaches that of intestinal obstruction. Suppurative inflammation, necrosis or gangrene may follow. From obstruction, acute inflammation of the pancreas is distinguished by an even more sudden and overwhelming onset. The localization of pain is more apt to be epigastric, and the increased peristaltic action of the bowel when obstructed would not be expected. A perforated peptic ulcer would likewise come to mind, and here the history would be helpful. If the abdomen is opened, a characteristic fat necrosis may declare the pancreatic origin of the trouble, due to the digestive powers of the secretion.

Because of the location of the pancreas, tumors of this organ are usually to be found in the epigastrium or left hypochondrium. If a rounded mass presents itself in this area, a pancreatic cyst would be suggested. The pulsation transmitted to such a cyst by the abdominal aorta, suggesting aneurysm, may usually be eliminated by causing the patient to assume the knee-chest position.[5] Roentgen-ray study of the stomach should exclude cancer of that organ.

Certain pathologists, notably Warthin, have endeavored to show that syphilitic pancreatitis is a frequent cause of diabetes mellitus. There is little corroborative evidence. Williams, Mitchell, Rosenbloom, Joslin and Lemann, have all presented data to the contrary. In seventy-eight cases of diabetes reviewed by the writer a year ago,[6] syphilis had been recognized in three only. Clinical recognition of syphilis of the pancreas is hardly possible without evidence of a luetic affection elsewhere or a positive Wassermann reaction. Tuberculous pancreatitis likewise would require a more or less general background of tuberculosis for its recognition.

5. Opie, Osler's Modern Medicine, 2nd Ed., 111, 647.
6. Smith, James H., Va. Med. Monthly, February, 1923.

Briefly to review the diagnostic considerations up to this point, disease affecting the external secretion of the pancreas is to be inferred from disturbance of digestion with its attendant pain, discomfort, wasting and anaemia; from the gross and microscopic character of the stools; from a study of the enzymatic activity of the fæces, the tryptic activity of the duodenal contents, and the starch-splitting power of the blood and urine. These data suggest faulty pancreatic function. Naturally they are more pronounced in the conditions resulting in obstruction of the pancreatic duct —calculi, cancer and cysts. Jaundice, the outward sign of a deranged liver, is also the only color in which the pancreas with its colorless secretion can signal its distress. Acute hemorrhagic pancreatitis gives the picture of an upper abdominal catastrophe of the gravest kind. In a pancreatic cyst, the tumor would have the common physical characteristics of a cyst, would usually tend toward the left of the upper abdomen, and often transmits pulsations from the abdominal aorta. If, now, carbohydrate metabolism is impaired, as shown by glycosuria or abnormally high blood sugar under normal dietetic conditions, any suspicions held as to a parenchymatous lesion of the pancreas are strengthened. Carbohydrate tolerance tests, experimentally conducted, are as yet having widely different interpretations put upon them. Some would assign them value in the study of thyroid function, and others plot a blood sugar curve for cancer anywhere from the tongue to the anus.

It is seen, then, that the pancreas, as regards its external secretion, is still a subject that lies tucked away behind the stomach, duodenum and the liver, both in the patient's abdomen and in the purview of the diagnostician. That we know more about a fractional part of the gland, the Islands of Langerhans, than we do about the major part, is due to the highly specialized function of the former. Until very recently, there was a question in the minds of some, whether diabetes mellitus was essentially a disease of the internal secretion of the pancreas. That may be considered as settled, and this weird and fascinating subject has become one of the things of which we may speak with comparative confidence. Endocrinology has got itself labeled as a pseudo-science and the nest of theorists. The enthusi-

asm of its followers may lead them often to venture into the speculative, but solid achievement in the realm of the thyroid and pancreas, to mention none other, may well account for their faith and hope.

The diagnosis of frank diabetes mellitus is familiar to every medical student. Sugar in the urine should be regarded as due to diabetes until proved otherwise. Unless urinary sugar can be shown to be some form other than dextrose, potential or early diabetes is a safer working diagnosis than alimentary glycosuria. Carbohydrate tolerance tests are useful but, after all, the best test is a knowledge of the way the patient metabolizes a normal average diet. Renal diabetes is a rather rare condition in which the blood sugar remains normal on an average diet, though sugar appears in the urine. A low renal threshold for sugar is inferred. The symptoms of diabetes mellitus are lacking and it should not be treated as such. Diabetes insipidus is not a disease of carbohydrate metabolism. Loewi's phenomenon, the pupil dilating under the influence of adrenalin, seems to apply about equally well to exophthalmic goiter, diabetes and grosser pancreatic lesions (Garrod). It is an interesting observation, doubtless indicative of a relation between these conditions through the sympathetic nervous system, but it can hardly be considered necessary or valuable in the diagnosis of diabetes.

A discussion of the treatment of diabetes and its complications would carry us far beyond the limits of this paper. As it was a hundred years ago, so now, the treatment is primarily dietetic. Until 1922 the problem was to find out the patient's tolerance, to induce him to live within it, and to teach him how to do it. With the introduction of insulin, the situation has changed. A great tactical advantage is won, but the strategic principles are not altered. Insulin does one specific thing: given hypodermically or intravenously, it metabolizes sugar. We have no ground, as yet, to believe that the pancreatic lesion is healed, nor is it certain how far carbohydrate tolerance can be restored. In other words, it is substitution therapy, not a cure. The diabetic is not enabled to return to a normal diet; but his own inadequate tolerance can be added to in grams by the use of insulin, unit by unit, till the diet is brought to a reasonable and comfortable level. Acidosis is controlled even, sometimes, when the patient is in coma. The dangers of hypoglycemia are not great if intelligent care is used.

To my mind this one achievement of honest medical effort offsets all the offenses of a generation of quacks. The foundation was laid by years of work by faithful scientists from von Merring to Allen. To few has it been given to serve their country in war and their fellowmen in the ways of peace, in the measure that has come to Banting, the youthful Canadian.

It now remains for the public health authorities, hospitals and philanthropic individuals to provide adequate clinics for these sufferers. This necessity does not arise out of any enormous cost of insulin, reports to the contrary notwithstanding. The factors involved are unique. The disease is chronic, requiring, under the best conditions, about a month of close observation of the patient, preferably in a hospital. This in itself, is no great stumbling block. It has been overcome with reference to tuberculosis, insanity, orthopedic and other diseases. Diabetes, however, is exceptional in that its management demands unusually close co-operation between three separate hospital departments—the ward, the laboratory and the diet kitchen. Above all, and surpassing the requirements in any other disease, there is the need to educate the patient in food values. People of all grades of intelligence and all sorts of home conditions, must be dealt with. The painstaking, conscientious efforts of a competent teacher are here essential. Usually a specially trained nurse or dietitian is best suited to the job. Manual training has been introduced into our public schools to provide our youth with a trade. Educational diabetic clinics must be organized in our hospitals to restore to economic efficiency and to save the lives of those who cannot follow the trade they have learned.

THE SURGERY OF THE PANCREAS.*

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The pancreas is situated behind the peritoneum and lies across the posterior abdominal

*Read as part of symposium on The Pancreas, at the fifty-fourth annual meeting of the Medical Society of Virginia, at Roanoke, October 16-19, 1923.
Dr. Ownbey substituted for Dr. J. T. Buxton, the original appointee, who was prevented by illness from taking part in the symposium.

wall at the level of the first and second lumbar vertebrae. It is five to six inches in length, one and one-half inches in breadth, and from one-half to one inch in thickness. The broad right extremity or head rests in the hollow of the duodenal curve. The body lies behind the stomach, and the tapered extremity or tail comes into contact with the spleen, and has the left kidney lying behind it.

The pancreatic duct or the canal of Wirsung is the principal excretory duct of the pancreas and extends through the substance of the gland from left to right. Commencing small by the junction of the little ducts of the lobules situated in the tail of the pancreas, it gradually grows in size as it constantly receives the ducts of the lobules composing the gland. Upon reaching the neck the duct turns obliquely downward, backward, and to the right. It comes into relation with the common bile duct, lying to its left side. After leaving the head of the gland it passes very obliquely through the mucous and muscular coats of the duodenum, and usually terminates by an orifice common to it and the common bile duct upon the summit of an elevated papilla, situated at the inner side of the descending portion of the duodenum, three or four inches below the pylorus. Occasionally the common bile duct and the pancreatic duct open separately into the duodenum. The duct of Santorini is frequently seen as an accessory duct of the canal of Wirsung given off in the neck of the gland. It passes horizontally to the right and opens into the duodenum about an inch above the orifice of the main duct. The pancreas resembles the salivary glands in that each lobule consists of one of the ultimate ramifications of the main duct, terminating in a number of cecal pouches or alveoli which are almost completely filled with the secreting cells, so that the lumen is barely visible. In certain parts, chiefly in the tail, there are found in the connective tissue among the gland tubules and alveoli, collections of cells, known as the islands of Langerhans, being named after the author who first described them in 1869.

The pancreas has two chief functions, that of an organ of internal secretion and of external secretion. The islands of Langerhans furnish the internal secretion and are not connected in any way with the duct system of the pancreas. The internal secretion controls the assimilation of sugars and a lack of this secretion produces the well-known condition of diabetes mellitus. The external secretion is the most active and most important of all the digestive juices.

Diseases of the pancreas may be divided as follows:

1. Solid tumors:
   - Cancer
   - Sarcoma
2. Fluid tumors:
   - True cysts
     - a. Retention cysts } adenomata
     - b. Proliferative cysts } epitheliomata
     - c. Congenital cysts
   - Pseudocysts
   - Hydatid cysts
3. Pancreatic lithiasis.
4. Wounds of the pancreas.
5. Pancreatitis (as classified by Mayo Robson):
   - Acute
     - a. Hemorrhagic
       - a. Ultra-acute, in which the hemorrhage precedes the inflammation, the bleeding being profuse and both within and outside the gland.
       - b. Acute, in which inflammation precedes the hemorrhage, which is less profuse and is distributed in patches throughout the gland.
     - b. Gangrenous
     - c. Suppurative (diffuse)
   - Subacute
     - a. Abscess of the pancreas
   - Chronic. Intestitial
     - a. interlobular
     - b. interacinar

Carcinoma of the Pancreas

Carcinoma is the most common neoplasm of the pancreas and, while it may be primary, it is usually not, being more frequently secondary to lesions of the stomach, duodenum, gall-bladder and bile ducts. When primary it involves the head of the gland in most all cases. Patients suffering with cancer of the pancreas are usually past middle age of life and give a history of vague digestive disturbances, accompanied by general weakness and rather rapid emaciation. Obstruction of the bile ducts may occur with a resulting jaundice which develops gradually, painlessly, and never lessens in its intensity. Should the lesion extend backward so as to involve the vena cava and portal vein, ascites will develop. Should the islands of Langerhans be involved to a very great extent there will develop a glycosuria. The association of chronic jaundice with distention of the gall-bladder is generally considered as an almost pathognomonic sign of cancer of the head of the pancreas (law of

Courvoisier). Surgical treatment in cancer of the pancreas carries with it an almost prohibitive mortality. It is doubtful if even an exploratory operation is justifiable if one is reasonably certain that the condition being dealt with is cancer. However, in some instances much relief has been obtained by an anastomosis being made between the gall-bladder and a convenient portion of the intestinal tract. This will afford a somewhat satisfactory drainage of the bile with a lessening and perhaps complete relief from the itching and ill-feeling produced by a deep jaundice.

Sarcoma of the Pancreas

Sarcoma of the pancreas is found infrequently as a primary growth and only very occasionally is it observed as a secondary growth. A few cases have been reported where a sarcoma has been removed with gratifying results.

Cysts of the Pancreas

Cysts of the pancreas may be classified as true pancreatic cysts, pseudocysts and hydatid cysts.

Among the true cysts we have (1) retention cysts, due to the obstruction of the outflow of the pancreatic secretion, with the resulting dilatation of the ducts of the acini; (2) proliferative cysts or cystic neoplasm. These are cystic tumors, due to spontaneous proliferation of the epithelial elements of the gland, with accumulation of the fluid in the cavities which are so formed. They may be simple such as cyst-adenomata; or malignant, cystic epitheliomata or carcinomata; (3) congenital cystic disease of the pancreas which is exceedingly rare. Pseudocysts constitute a large porportion of cases reported as pancreatic cysts. While they may be found within the substance of the pancreas, the greatest number of pseudocysts are formed in contact with the gland, particularly in the lesser peritoneal cavity, usually as a result of some traumatic injury to the pancreas in which there has resulted some hemorrhage in or around the pancreas.

In the early stages the symptoms of cysts of the pancreas are vague. Pain in the epigastrium or just above the umbilicus may be present and may occur even when the cyst is not palpable. Epigastric distress with a feeling of fullness and vomiting may be the chief complaints. Should there be adhesions to the stomach, certain gastric disturbances will probably be present. Emaciation and weakness have often been recorded and in not a few cases will be very striking. In some instances pressure symptoms may be observed, pressure on the portal vein producing ascites and compression of the vena cava causing edema of the legs. Nothing is found upon physical examination unless the tumor mass be large enough to palpate, in which instance, fluctuation can usually be made out though at times the sac is so tense that it appears to be a solid growth. The tumor is situated in the epigastrium and may be to the right or left of the median line. Cysts of the pancreas are usually most difficult to diagnose.

Cysts of the pancreas are amenable to surgical treatment and may be treated in one of the following ways: (1) aspiration; (2) evacuation and drainage; (3) extirpation, partial or complete.

Aspiration was used in some of the earlier cases but has now been abandoned.

Evacuation and drainage is the operation most generally applicable.

The abdomen may be opened on one or the other side of the median line above the umbilicus. The cyst is exposed by dividing its peritoneal coverings which vary according as to whether the cyst is above or below the stomach. Usually it is most easily reached by going through the greater omentum just below the stomach. Upon exposing the cyst it should be well walled off by means of gauze sponges to minimize the possibility of the contents of the cyst, which are very irritating, coming into contact with the intestines and abdominal viscera. The greater part of the contents may be withdrawn by introducing a large aspirating needle into the sac. The puncture is enlarged and the cavity temporarily packed with gauze to soak up the remaining fluid, while the edges of the opening are sutured to the parietal peritoneum. One or more drainage tubes are then introduced and are gradually removed as the cavity obliterates itself. In some instances fistulae through which pancreatic juice discharges may remain for months after this operation.

Extirpation is applicable only in those cases where the pedicle is small and there are few or no adhesions. However, should the cyst appear malignant in character, a serious effort should be made to remove it. Malignancy is indicated when little intra-cystic growths can be felt.

Pancreatic Lithiasis

Pancreatic lithiasis is a condition that is not often found but is probably more commonly present than is suspected. The stones are usually found lodged in the ducts though there may be cases in which they are found in a cystic diverticulum. The smaller stones may be expelled into the intestines without any symptoms. They are composed chiefly of the carbonate or phosphate of lime and possibly some cholesterin. They are usually irregular in shape, firm and white or grayish-white in color.

There may or may not be any symptoms of stones in the pancreas. Pain which is generally localized in the epigastrium is the most common symptom and may be slight or severe and paroxysmal. Nausea and vomiting often accompany the attacks. Jaundice is only occasionally seen and is most often due to gallstones occurring simultaneously though it has been produced by a large pancreatic stone pressing upon the common bile duct sufficiently to produce obstruction to the flow of bile. Chills and fever may occur according to the amount of infection present. Glycosuria is a late manifestation of the disease and is present only after an involvement of the islets by an intra-lobular pancreatitis. Alimentary glycosuria is a significant and frequent finding. Most pancreatic calculi are discovered accidentally while operating for some other upper abdominal condition.

The treatment is surgical and consists of the removal of the stones. The situation of the calculi determines the method of procedure. Stones in the ampulla of Vater or in the right extremity of the duct of Wirsung may be removed by opening the duodenum and incising or stretching the papilla common to bile and pancreatic ducts, so that forceps or a probe may be introduced into the duct of Wirsung. Should the calculi be situated some distance from the papilla, it will be necessary to expose the pancreas through the gastro-hepatic omentum or through the transverse mesocolon. The gland is incised over the stone, the stone removed and the incision closed by deep sutures of catgut. In some instances the stone can be more easily reached by severing the reflection of peritoneum from the duodenum to the abdominal wall and retracting the duodenum anteriorly and to the left. Whenever the gland has been cut, it is safest to insert a cigarette drain down to site of incision.

Wounds of the Pancreas

The pancreas is very infrequently wounded because of its depth within the abdomen, its protection by other viscera and the partial shelter afforded by the costal arch.

Gunshot and stab wounds constitute the most frequent injuries and next to these are such injuries as would result from a violent blow upon the epigastrium, as by the kick of a horse or from being crushed, such as would occur when a heavy vehicle passes over the body.

The pancreas is practically never injured unless there occur simultaneous wounds of some other abdominal viscus and symptoms of injury to the pancreas are usually masked by the symptoms of the lesions of other organs such as the liver, stomach or spleen.

In any case where there is a stab or gunshot wound or severe contusion of the abdomen with evident signs of intra-abdominal injury, it is not so important that a diagnosis be made before operation but that an exploratory operation be done and it is imperative that the pancreas receive a thorough inspection. The chief dangers from injury to the pancreas are hemorrhage, infection and fat necrosis. In favorable cases of punctured or incised wounds, the torn edges may be brought accurately together by strong catgut sutures, passing through the capsule and parenchyma, care being taken to avoid catching up the duct of Wirsung. If there has been much hemorrhage, it must be thoroughly controlled and provision made for drainage. Fat necrosis necessitates the free drainage of the secretion and probably leaving the wound open with tamponing of the abdominal cavity. In all operations on the pancreas one should be careful to produce as little trauma as possible.

Pancreatitis

Of the two chief forms of pancreatitis, catarrhal and parenchymatous, the latter is the more frequent and the most common.

There are three principal theories to explain the cause of pancreatitis but as yet the cause and the way in which it works is still somewhat unclear. The first theory is that pancreatitis is produced by the effect of bile entering the duct, or by reason of an obstruction due to a stone or mucus or by a spasm of the duct sphincter at the outlet of the common duct.

The second is that duodenal contents are forced into the common duct at a time when it is temporarily relaxed and thence into the pancreatic duct. The third explains it by a lymph-borne infection from the gall-bladder, bile ducts and duodenum. And then there are those who believe that the infection may be hematogenous in origin.

As regards the obstruction of the flow of the bile through the sphincter, two explanations have been offered. In the first place, as can be easily understood, it is possible for a stone to block the ampulla of Vater in such a way as to make the common bile duct and the pancreatic duct into one. Second, it is believed that acid in the duodenum will produce a spasm of the sphincter and this theory is borne out clinically by the fact that chronic pancreatitis is often present in patients with ulcer of the duodenum and in alcoholics. In these persons it is thought that the acid injected into the duodenum remains longer before it is neutralized than in normal individuals.

It has been shown experimentally that normal bile introduced into the ducts of the pancreas produces inflammation and necrosis of the parenchyma with which it comes into contact. Others claim that, when normal bile enters the pancreas, no particular harm is done. However, when infected bile enters the pancreas, there occurs extensive and massive destruction with edema, congestion, hemorrhage and an inflammatory response on the part of the fixed connective tissue.

It has been shown experimentally that mucin modifies the irritant action of bile and, therefore, any condition such as an obstruction of the cystic duct by a stone, which would tend to lessen the normal amount of mucin, furnished by the wall of the gall-bladder, would render the occurrence of pancreatitis more likely.

According to Deaver, infection carried by way of the lymphatics plays the most important role and supports his view by the statement that in most instances chronic pancreatitis is associated with the inflammation of some abdominal viscus and that the most often diseased part of the gland—the head (the part furthest removed from the duct)—is that which has a free lymphatic relationship with the affected viscus. He has designated that part of the head of the pancreas which is most often found diseased as the triangle of infection, that is, the area between the ducts of Wirsung and Santorini.

As to the pancreatitis being produced by the entrance of the duodenal contents into the pancreatic duct, it may be said that this is a possibility that seldom occurs. It has never been proven by animal experimentation but the possibility is evident by the fact that in a few instances post mortem dissection has shown the pancreatic duct opening directly into the lumen of the intestine and, in one or two cases, a localized pancreatitis has been demonstrated around the duct of Santorini.

According to the conclusions drawn by Mann and Giordano from their experimental work, we must look elsewhere for the explanation of the cause of mose cases of pancreatitis than the passing of bile into the pancreatic duct, but to the greater number of clinicians and surgeons the most plausible explanation for the cause of pancreatitis is the one attributing the condition to a reflux of bile into the pancreatic duct.

Acute Pancreatitis

In this paper the term acute pancreatitis covers the acute hemorrhagic, acute gangrenous, and acute suppurative forms, since they are all phases of the same condition and are not distinct pathological entities, though as a rule the latter two follow the first named condition.

As to the relation between hemorrhage into the pancreas in acute pancreatitis and inflammation there has been considerable controversy. There are those who hold that hemorrhage occurs altogether apart from inflammation, not caused by it, not causing it; that such hemorrhage may be fatal and at post mortem examination not the smallest trace of an inflammatory process found. This condition is known as "pancreatic apoplexy." There are others who hold that an acute inflammation is the primary factor and the hemorrhage, slight or severe, is secondary. And still there are others who contend that the hemorrhage occurs first and is followed speedily by an acute inflammatory outbreak.

Symptoms—Acute

The patients are usually of middle age and obese. The onset is sudden with intense pain in upper abdomen. The severity of the pain is the most significant thing. The location of the pain is most often in the epigastrium and may be on the left but is more commonly felt

on the right of the midline near the gall-bladder region. However, the location is so variable that it is of little importance. Vomiting occurs and is repeated again and again without bringing relief. The skin is pale and moist, the pulse rapid and of poor quality, temperature normal or subnormal. There may be cyanosis, shallow breathing and dyspnea. Tenderness is usually marked, not localized, but extends across the epigastrium. Distinct rigidity of the muscles is rare though some resistance may be felt on deep palpation. Should the patient survive the acute onset for twenty-four to forty-eight hours, the hyperacute symptoms will subside and in two or three days signs of acute upper abdominal peritonitis may appear. Suppuration is characterized by fever, chills, weakness, emaciation, high leucocyte count, marked tenderness and rigidity. Acute pancreatitis must be differentiated chiefly from perforation of a duodenal or gastric ulcer and gall-stone and kidney stone colic. However, the pain in acute pancreatitis is much more severe than in other of conditions named. Exercise increases the pain of acute pancreatitis and this fact tends to differentiate it from kidney colic. Constipation is marked as the result of a toxic ileus, and the condition is often mistaken for intestinal obstruction but vomiting lessens in acute pancreatitis while in obstruction it is usually progressive. William Linder states that tenderness in the left costo-vertebral angle is of extreme diagnostic importance and invariably means involvement of the tail of the pancreas. In all cases of suspected acute biliary disease an associated pancreatitis should be considered.

Treatment consists in immediate operation. The earlier the operation, the greater the chance of recovery, although we now know that mild cases often get well spontaneously. It is not advisable to delay operation hoping that the signs of shock may lessen. The collapse is due to absorption of toxic products of the pancreatic necrosis and delay will allow a steady increase, lessening chance of recovery. A longitudinal incision of sufficient length is made through the middle or to the inner side of the right rectus to give a good exposure of the pancreas. There are three routes by which the pancreas may be exposed and the omental bursa opened: (1) above the stomach, through the gastro-hepatic omentum; (2) below the stomach, through the upper part of the gastro-colic omentum; (3) through the transverse mesocolon. The second route is the usual method of approach. Should there be marked necrosis and hemorrhage, more than one route may be opened and gauze drains inserted in order to drain thoroughly and prevent the spread and absorption of the toxic products. Upon opening the peritoneum a blood stained fluid or a peculiar odorless beef-broil fluid may escape and the pancreas is found to be greatly swollen, dark in color and engorged in blood. Yellowish white spots of fat necrosis may be seen in the mesentery or the omentum or the pancreas. It should be punctured lightly in several places and free drainage afforded. This is accomplished by means of pieces of rubber dam tucked into the slits in the pancreas and also gauze which are brought out together through the original wound or through a posterior stab wound in the left loin, or even in both directions. The gall-bladder and bile ducts are rapidly inspected and, if the patient's condition be satisfactory, such treatment of them adopted as seems proper. However, in the severe cases it will be better to establish free drainage as quickly as possible and leave the biliary tract pathology for a later operation.

Subacute

Subacute pancreatitis is similar to acute pancreatis except to a slighter degree. In this condition we have single or multiple abscesses of varying sizes in or around the pancreas which have formed usually following an acute pancreatitis. The condition may begin with the sudden onset of pain, acute, but not overwhelming, in the epigastrium. Vomiting often occurs but faintness and collapse are not so marked. The pulse is not so rapid and the patient does not look so ill. Instead of hastening to his end he lingers on and in a few days, as an abscess begins to form and enlarge, the temperature rises, often reaching 103° to 104°, and there may be a succession of rigors. The loss of flesh and strength is most striking. Epigastric tenderness is rather marked and in some instances a swelling may be made out.

The subacute variety is much more amenable to surgical treatment than the acute. Upon opening the peritoneal cavity, fat necrosis is usually observed and is a pathognomonic sign of the condition you are dealing with. Drainage here is the chief factor in the treatment.

The abscess may be evacuated through the

anterior abdominal wall or through incision in the lumbar region as has been described under treatment of acute pancreatitis.

Chronic Pancreatitis

Chronic pancreatitis is of the two forms: (1) chronic interlobular pancreatitis, characterized by an overgrowth of connective tissue between the lobules; (2) chronic interacinar pancreatitis with an atrophy of the acini and a growth of connective tissue between the acini with slight involvement of the interlobular septa. In the latter type the islands of Langerhans are often degenerated and sclerosed.

The chief symptoms of chronic pancreatitis are emaciation; creatorrhea; steatorrhea; glycosuria and pain which is present in half or less than half of the cases and, when it does occur, is difficult or impossible to distinguish from that of duodenal ulcer or gall-stone. The pain is deep seated and radiates posteriorly into the left shoulder. Should colic be present, it is usually due to calculi. Occasionally some resistance is felt in the epigastrium which does not move with respiration thus differentiating it from tumors of the stomach. However, an enlargement sufficient to be palpable is rare.

The diagnosis of chronic pancreatitis by the surgeon at operation is open to criticism because he bases it upon the palpation of an enlarged and hard pancreas. A hard pancreas is not necessarily a diseased pancreas and no organ varies more in size than the pancreas. It is also extremely difficult to differentiate chronic pancreatitis from cancer of the pancreas. Deaver thinks it can practically never be done.

Since chronic pancreatitis is most often associated with diseases of the biliary tract, the best results from surgical treatment will come by the proper management of the pathology of the biliary tract encountered at operation. Drainage of the bile is the most important thing and may be effected in one of three ways: (1) choledocotomy; (2) cholecysenterostomy; (3) cholecystostomy. Robson and Moynihan believe that tube drainage direct to the skin is much more efficient and satisfactory. It is best to keep the external fistula open until the bile appears healthy, which requires from a few weeks to more than a year. The close etiologic relationship of pancreatitis and diseases of the adjacent viscera should always be borne in mind when operating in the upper abdomen and the proper handling of a beginning cholecystitis or bile tract infection will prevent most of the cases of pancreatitis. Medical men should be aware of this fact and not hold cases of bile tract infection under medical treatment too long before referring the patient to a surgeon.

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THE ETIOLOGY AND PREVENTION OF DIABETES.*

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Diabetes is essentially a deficiency of the secretion of insulin by the Islands of Langerhans in the pancreas. According to modern nomenclature the word "hypoinsulinism" would better describe the condition characterized by an excess of sugar in the blood than does diabetes mellitus, which the ancients gave it because of the presence of sugar in the urine. Hypoinsulinism is also a better name for the condition than glycosuria because the latter condition may be transient and result from the use of phlorizin, or adrenalin, and it also may be a sequence of emotional disturbances and a condition of the kidneys known as low renal threshold, in which there is no deficiency in the secretion of insulin and a normal amount of sugar in the blood.

Hyperinsulinism.

From recent observations, I am convinced that there is a definite syndrome, perhaps a distinct disease entity, which should be called hyperinsulinism, the symptoms of which are those as described as resulting from hypoglycemia. While not strictly relevant to the subject assigned me, I mention this in order for it to be a matter of record when published, because I have seen no mention of it in medical literature. Every physician who has had much experience in treating digestive diseases sees patients who, when their stomachs are empty, complain of extreme hunger, weakness, nervousness, tremulousness, sometimes dyspnoea, subnormal temperature and low blood pressure. We have examined the blood sugar in two such patients at the time when they were having the symptoms described above and their blood sugars were .065 and .070, respectively. The symptoms disappear after eating or after taking a soft drink. In one of these cases the blood sugar went up to .130 after a meal of high carbohydrate content. It is possible that hyperinsulinism may precede hypoinsulinism as hyperthyroidism is sometimes followed by hypothyroidism. We are beginning some observations (which we hope to publish in a few months) on patients who have nervous symptoms associated with hunger that we believe to be the result of hyperinsulinism.

*Read by invitation as part of the Symposium on the Pancreas at the fifty-fourth annual meeting of the Medical Society of Virginia, in Roanoke, October 16-19, 1923.

Pancreatitis Precedes Diabetes.

But to get back to the discussion of the etiology of diabetes, anything that can inhibit or destroy the function of the insulin-producing cells may cause the disease. It is therefore obvious that the causes of diabetes, like the sins of men, are many. It seems probable, however, that the most important underlying factor in the production of diabetes is a preceding, or a concurrent, pancreatitis; and in discussing the etiology of diabetes, the causes for infection of the pancreas should receive prime consideration.

The theory that a damaged pancreas precedes hyperglycemia does not in the least disprove the theory that over-eating or improper eating is a predisposing or an exciting cause of diabetes. In the first place, a crippled pancreas may be able to metabolize the glucose producing foods in the normal diet, but would fail to take care of the carbohydrate in the debauches of the gourmand; secondly, the point that I desire to stress particularly is, that pancreatitis is often the result of the vitamin deficiency in a diet in which there may be an excess of proteins, carbohydrates and fats.

Sources of Infection in Pancreatitis.

Since a pancreatitis resulting in permanent damage to the pancreas is the most important predisposing cause of diabetes, it is necessary to consider the sources of the original infection in pancreatic inflammations.

On account of its protected position, primary infection of the pancreas must be rare. Trauma of the pancreas, however, associated with other internal injuries, does occur. We recently have had two cases of severe diabetes which developed so soon after railway accidents that there can be but little doubt that the internal injury involving the pancreas was the direct cause of the glycosuria. These cases were reported at the recent meeting of the American Medical Association.*

Secondary infection of the pancreas may take place in a number of ways but, on account of its anatomical relations, its blood supply and its lymphatic connections, it would seem that the most frequent sources of infection come from lesions in the gall-bladder, stomach, duodenum, and other portions of the small intestines and the colon. Indeed, when the

*Journal of the American Medical Association.

anatomical relations and the collateral circulation of the pancreas are considered, it is difficult to understand how it escapes infection, when there is an inflammatory lesion of any viscus in the abdomen or of any part of the peritoneal cavity.

The Role of Gall-Bladder Infections.

Infections of the gall-bladder would seem to be, and often are associated with a pancreatitis. The opening of the common bile duct in the duodenum is very close to the openings of the ducts of Wirsung and Santorini, when the latter does not empty into the main duct. The common bile duct is always in contact with, and often embedded in, the head of the pancreas; therefore it would seem that, both by continuity and contiguity of structure, a cholangitis or a cholecystitis would be associated frequently with an inflammation of the pancreatic duct, (sialo-angitis and sialodochitis) and a generalized pancreatitis.

The fact that surgeons, in operating for gall-bladder disease, so frequently find an enlarged and inflamed pancreas, which subsides with the removal of the gall-bladder infection by drainage, seems to favor the theory that pancreatitis is often secondary to gall-bladder disease. I have observed several such cases, in two of which the surgeons, after opening the abdomen, made the erroneous diagnosis of cancer, because of the enlarged hard pancreas with extensive adhesions to surrounding structures. In both cases, drainage of the gall-bladder gave relief of symptoms, with restoration to health and no evidence of pancreatic disease over a period of two and four years.

A number of cases have been reported of glycosuria patients whose urine became sugar free after gall-bladder drainage. We have had one such case; therefore, it would seem advisable to suspect gall-bladder infections in diabetes and, if such exist, a gall-bladder drainage may cure the pancreatitis and at the same time remove the primary or associated lesion. In gall-bladder infections associated with diabetes, or with known pancreatic lesions, drainage would seem to be indicated rather than a cholecystectomy. I would not be understood as advising an operation as a cure for diabetes but, in cases in which there is known gall-bladder disease, it seems likely that there is associated an active pancreatitis and the operation for the gall-bladder condition, which may be the focus of infection for the pancreatitis, may save the pancreas from further damage, and in that way be helpful to the diabetic.

Stomach and Intestinal Infections.

Since the pancreatic duct, or ducts, open in the descending portion of the duodenum, and the head of the pancreas is almost entirely surrounded by the coil of the duodenum, it would seem that a duodenitis, which we know to be a frequent condition, may be followed by pancreatic disease. Ulcers of the duodenum may result in adhesions to the pancreas with subsequent pancreatitis. The jejunum is also in relation to the inferior surface of the body of the pancreas.

The concavity of the lesser curvature of the stomach corresponds approximately to the convexity of the anterior surface of the pancreas; and ulcer and carcinoma of the stomach result in adhesions to, and secondary infection or metastasis of, the pancreas.

The anterior surface of the pancreas is separated from the transverse colon by the lesser peritoneal sac, and the colon itself may actually be in contact with the inferior surface of the pancreas. A colitis may be followed by pancreatitis, and in my opinion lesions of the colon are perhaps the most frequent sources of infection of the pancreas.

Since the spleen, the left kidney and the left suprarenal body are in contact with the tail of the pancreas, the primary infection in pancreatitis may be in one of those organs.

Hematogenous Infections.

Pancreatitis undoubtedly may be of hematogenous origin, and the removal of focal infections from the tonsils and teeth should receive the same consideration as in the inflammatory diseases of other organs of the body.

Pneumonia, measles, scarlet fever, influenza and other general infections may also cause pancreatitis. Many diabetics assert that a few months after an illness from some of the acute communicable infections, sugar was first found in their urine. It is possible that the recent severe epidemics of influenza or "flu" may account partly for the apparent increase in diabetes in the last few years.

Syphilis, while not playing the important part that some have thought, no doubt does affect the pancreas. We have had one case recently in which we thought syphilis was the

cause of diabetes. The story of the negro who, after a positive Wassermann, was told that he had syphilis, replied: "Yassir boss, I knows dat but I's sick too," illustrates the fact that the syphilitic may have diabetes without luetic involvement of the pancreas. It may also be a fact that a person has had diabetes for months or years and contracts syphilis and sugar is found in his urine when undergoing treatment for the latter condition. Clinicians of large experience generally agree that syphilis is not a frequent cause of diabetes.

It would seem, since the blood supply of the pancreas comes from the superior and inferior pancreatic-duodenal branches of the hepatic and superior mesenteric arteries, and from the splenic artery, that infections of the intestinal tract would be carried in the blood stream to the pancreas; and that intra-abdominal lesions are the most frequent sources of pancreatitis. McCarrison made sections of the intestines of pigeons in which he had produced an enteritis by feeding them exclusively pure carbohydrates. These sections, on microscopic examinations, showed eroded villi with the blood tract thereform leading to distended subperitoneal vessels, constituting a direct passage for intestinal organisms to the blood stream. The intestines harbor the various streptococci, the colon bacillus and other pathogenic organisms, and there then can be no question but that enteritis and colitis in human beings are the foci of infection for the pancreas and even the remote organs of the body.

Since the pancreas is rich in its lymphatic relations with the intestines and other abdominal viscera, its afferent lymph channels no doubt often bring to it pathogenic organisms from adjacent diseased tissues.

Gastro-Intestinal Infections as Primary Foci in the Production of Pancreatitis and Diabetes.

We know that infections of the gastro-intestinal tract are among the most frequent diseases of both infant and adult life; and in my opinion that is the source to which many of the infections of the pancreas with the resulting impairment of the insulin forming glands must be finally traced. I have not seen any statistics on the incidence of gastro-intestinal diseases in the United States, but I am convinced that they are increasing. Recent reports from various clinics in England show that 25 per cent of all patients admitted have abdominal lesions. When we consider the large number of abdominal operations for appendicitis, gastric and duodenal ulcer, and gall-bladder infections, as well as the frequency of the medical diseases of the gastro-intestinal tract, such as acute and chronic gastritis, enteritis and the colitis associated with both diarrhea and constipation, it surely seems that gastro-intestinal diseases are among the most frequent of the present time.

The causes for the increase in diseases of the digestive organs have been ascribed by McCarrison to faulty food. In his book "Studies in Deficiency Disease," and in his Mellon lectures before the Society of Biological Research, University of Pittsburgh, November 18, 1921, and published in the *Journal of the American Medical Association*, Vol. 78, No. 1, pp. 1-8, McCarrison describes his experiments on animals, and his observations among the natives of the Himalaya Mountains, which seem to prove that infections of the intestinal tract, particularly colitis, result largely from the present day diet of an excess of carbohydrates, fats and meat proteins, with a deficiency of the anti-neuritic and the anti-scorbutic vitamins, in addition to the lack of other requisite constituents of human food, particularly iodin, calcium and phosphorus.

McCarrison fed healthy monkeys on pure carbohydrates, fats and proteins—a diet similar to that of white bread, polished rice, potatoes, sugars and sweets of all kinds, lean meats, animal and vegetable fats, upon which most civilized peoples live—with a constantly resulting enterocolitis. He fed control monkeys on a diet containing the same amounts of carbohydrates, fats and proteins, but with the proper vitamins and mineral substances, and the control animals remained normal. He fed pigeons on autoclaved polished rice with the result that they not only developed enteritis and colitis, but a polyneuritis.

McCarrison's Conclusions.

McCarrison thinks that our present day diet of an excess of carbohydrates, fats and lean meats, with a deficiency of vitamins and mineral content, by lowering resistance of the tissues of the gastro-intestinal tract, deprives them of their protective power to prevent invasion of pathogenic organisms. He found

that properly nourished monkeys, when given quantities of the entameba hystolitica, did not develop dysentery, while those fed on a deficiency diet promptly developed diarrhea and the characteristic lesions of amebic dysentery.

McCarrison also called attention to the fact that in his nine years' practice among the inhabitants of a remote part of the Himalayas, during which time he performed an average of 400 major operations a year, he did not see a case of asthenic dyspepsia, gastric or duodenal ulcer, appendicitis, mucous colitis, or other digestive diseases, this in spite of the fact that the general hygienic conditions were bad. He thought this freedom from the abdominal infections so prevalent among civilized people was due to the fact that all infants were fed upon mother's milk, or they died; and that the adults among these remote tribes of the Himalayas lived on natural foods, i. e., milk, eggs, fresh fruits, leafy vegetables. They had no sugar or alcohol. McCarrison came to the same conclusion as Hinhide that "the two chief causes of death among civilized people are food and drink."

Intestinal Stasis a Cause of Colitis.

Applying to human beings the deductions drawn from animal experiments, McCarrison called attention to the similarity of the conditions observed in the intestines of animals fed on an exclusive pure carbohydrate diet and the anatomical factors seen in chronic intestinal stasis. Intestinal stasis, in my opinion, exists in a large majority of adult Americans. X-ray studies of the gastro-intestinal tract is a routine procedure in the examination of our patients. We find that in more than 75 per cent of cases the barium meal is still in the cecum and ascending and transverse portions of the colon 24 hours after ingestion. Examination of the feces is another routine laboratory procedure in our work and a large proportion of cases show mucus present in the specimens. Intestinal mucus means a lesion somewhere in the small intestines, or colon—we think usually in the colon. We have found intestinal stasis and mucus in the feces in many of our diabetics, and it seems to me that a chronic colitis is often the source of infection in the pancreatitis which impairs the function of the islet glands to the extent that diabetes develops.

Diabetes the Vestigium of a Burnt-Out Conflagration.

Allen speaks of diabetes as "the vestigium of a burnt-out conflagration." He made investigations on animals in which he produced experimental pancreatitis followed by hyperglycemia, thus proving to his satisfaction that a damaged pancreas is an essential factor in the etiology of diabetes.

It may be that the pancreatitis occurred years before the glycosuria is discovered and that the anamnesis does not elicit a history of a previous pancreatitis; but I believe that we may assume a previous or a present pancreatic infection in the majority of cases of diabetes and that we should endeavor to find the cause of the pancreatitis and remove it if possible. It seems probable, though it is not possible to prove it, that in many cases the pancreatitis was associated with the intestinal infections of infancy and that, though the pancreas be permanently damaged, the Islands of Langerhans are able to secrete enough insulin for normal carbohydrate metabolism in a person of average weight; but that in obesity, the overworked, crippled pancreas rebels against the load that has been placed upon it by the individual who over-eats.

Those who believe that over-eating is the sole cause of diabetes in many cases, and that the obese individual is potentially a diabetic, point to the fact that even in severe diabetics sometimes no lesions of the Islands of Langerhans can be demonstrated either macroscopically or microscopically. Allen meets this objection to the theory of a preceding pancreatitis as an important underlying factor in the production of diabetes, by stating the fact that he has produced pancreatitis in animals and that after their recovery autopsies have revealed no evidence whatever of the pancreatic infection which he knew had existed.

Banting is of the opinion that a pancreatitis is an important though not the only etiological factor in diabetes and, in support of this opinion, he cited instances in the Children's Hospital in Toronto in which the removal of infected tonsils was followed by a return to the normal, or a marked reduction in the blood sugar of infant diabetics.

The Role of Over-Eating in the Etiology of Diabetes.

The theory of a previous pancreatitis in

diabetes should not make us underestimate over-eating as a large factor in the production of diabetes. The statistics of Joslin* show clearly that the majority of diabetics, 60 per cent, are, or have been, overweight. Most of our diabetics give a similar history. Paulin† showed that the blood sugar was high in obese individuals who did not have glycosuria, and his conslusion was that they were potentially diabetics; but the normal pancreas can stand a heavy load and the great majority of obese individuals do not develop diabetes. Over-eating and a diet deficient in vitamins plus a damaged pancreas seem to me to be the important etiological factors in diabetes.

The Importance of Vitamins in the Diabetic's Diet.

In the treatment of diabetes it is as necessary to consider the vitamin content and the proper mineral constituents of food as to know that the starches and sugars and proteins and other glucose-forming foods are reduced to the patient's tolerance. Therefore, in making up the diabetic's menu, the fats should consist largely of butter and cream, which are rich in vitamin A; the carbohydrates should come principally from the green vegetables, which contain not only vitamins A, B and C, but are rich in iron calcium, phosphorus and other essential minerals, and from raw fruits and uncooked vegetables which contain the anti-scorbutic vitamin. The diabetic should be taught the vitamin and mineral values of his daily diet as well as the arithmetic of carbohydrates, fats and proteins.

I have recently had a case which illustrates the necessity of considering the vitamin content of the diabetic's diet. A young diabetic who had learned to weigh and measure his food in grams and who could estimate accurately the number of calories of proteins, carbohydrates and fats he could eat to keep his urine free from sugar and diacetic acid, had not learned anything of vitamins. He did not like milk and butter and had omitted them from his diet for years. On a daily diet of about 1250 calories, low in quantity and deficient in vitamins, he developed tuberculosis which with him was more serious than the diabetes. He undoubtedly had diabetes because it was pronounced so by one of the greatest diabetic clinicians in the country, and while the low diet allowed tuberculosis to develop, the function of the insulin-forming glands seems to have been restored. He is now in San Antonio, Texas, taking 3500 calories of a diet rich in vitamins and his urine remains sugar free. He has gained 25 lbs. in weight and seems to be recovering from the tuberculosis and apparently his diabetes has also been at least temporarily relieved.

Hereditary and Racial Susceptibility.

There are many other factors in the etiology of diabetes beside infections of the pancreas; because autopsies have shown extensive lesions of the pancreas with degeneration or destruction of a large part of the islet bearing tissue in persons who had no symptoms of diabetes during life. Heredity and racial characteristics are said to play a part and it may be true that one may, by inheritance or racial tendency, have a lowered resistance to infections of the pancreas. It seems likely, however, that what are often considered hereditary and racial tendencies are acquired conditions from habit and environment. For instance, it is no doubt true that the incidence of diabetes is greater among Hebrews than any other race. They also in my opinion suffer more from digestive disturbances than the individuals of other races. The Hebrews live in the cities. They are prosperous, they have plenty of food and are usually large eaters. They eat meats, fats, bread and sweets, but they are not vegetable eaters and their diet may be deficient in vitamins B and C. They also lead sedentary lives which predispose to intestinal stasis and colitis which, in my judgment, is the primary source of a large part of the infections of all the abdominal organs including the appendix, gall-bladder, liver and pancreas. So it may be that prosperity and city life have more to do with the incidence of diabetes among the Hebrews than has heredity and racial tendencies.

The Jews are known to have less tuberculosis than any other race in America. That too probably is not due to racial insusceptibility but to the fact that from the time of Moses, who described the "promised land" as flowing with milk and honey," to the present day, milk and butter, which are rich in vitamin A, the great protector against tuberculosis, have been an important part of the Jew's daily diet. The problem, therefore, in decreasing the in-

*Joslin: "Diabetic Manual," page 19, Lea & Febiger, 1919.
†Paulin: Southern Medical Journal, Vol. XV, 1922, p. 249.

cidence of diabetes among the Jews is to teach the sins of eating an excess of meats, bread, sweets and fats, and their need for eating more green vegetables and fruits that are rich in vitamins B and C, the proctectors against infection of the alimentary canal.

The negro race is said to be less susceptible to diabetes than the whites. That too is probbly not due to racial resistance to infections of the pancreas but to the negro's love for the green vegetables, fruits, milk and butter which are cheaper than meats and which contain the vitamins and mineral constituents which go to make up sound teeth and a healthy alimentary tract. For the same reason the negro is less susceptible to all abdominal diseases, including appendicitis and gall-bladder infections. It is likely that the deficiency of vitamin A in the negro's daily diet, more than any other factor, renders him less resistant to the ravages of tuberculosis instead of his having any racial susceptibility to the disease.

Emotional disturbances undoubtedly may bring on hyperglycemia as has been observed in many cases, but in these a damaged pancreas is probably the preceding cause. I recently had a patient who had shown sugar in his urine and had a high blood sugar while he was at work, about which he worried a great deal. After a few days' rest in bed in the infirmary, his urine became sugar free and his blood sugar normal and remained so for a month, even though he was allowed breads and other carbohydrates in large quantities; but on his return home to the worries incident to his business, the sugar in his urine returned. When he cut his work to six hours a day and ceased worrying, the sugar again disappeared from his urine.

Worry, overwork, grief and psychic shock of any kind that disturbs the sympathetic nervous system, may bring on transient glycosuria, but it is unlikely that permanent hypoinsulinism results from nervous influences in the individual with a pancreas that has not been crippled by previous disease.

The Deficiency Diet of the American People.

McCollum's observations on the diet of the American people as a factor in mouth infections apply equally to infections of all the organs of digestion, including the pancreas. He points out the fact that a diet of white bread, potatoes, refined cereal breakfast foods, polished rice, and sweets, the muscle cuts of meat and fat meat, lard and butter substitutes, is deficient in vitamins B and C, and lacking in calcium, iodin, phosphorus and other essential minerals. He is urging the American people to go back to the diet of our parents and grandparents, who lived on bread made from whole wheat flour, or whole corn bread, unpolished rice, milk and its derivatives, butter and cheese; the green vegetables and raw fruits, with a moderate amount of meats. McCollum has announced a formula of the perfect daily diet, i. e., "one raw fruit, one uncooked vegetable, two green vegetables and one quart of milk a day," to which should be added enough bread, butter and meat to meet the nutritional needs of the body. This diet, if carried out by the American people, would result in an enormous decrease in diabetics, along with a lessened number of cases of intestinal infections.

In my opinion, McCollum, Sherman, Funk and many others, in their studies in nutrition, have made discoveries which can be made of as far reaching good to mankind as the work of Pasteur and Lister. If what physicians now know of diet and nutrition were known and the knowledge applied by the public, diabetes would become a rare disease. The problem, therefore, is to teach all classes that can and will learn the simple principles of diet and nutrition.

Education in the Prevention of Diabetes.

Thomas Jefferson said: "The present generation is already lost; teach the youth of the country" and he founded as his life's greatest work the University of Virginia. Jefferson was only partly right, because some adults can learn and apply new knowledge, though the great majority, even though they know it, will shorten their lives, will continue the eating habits they learn in their youth. Calories and vitamins will continue to be a joke with most obese men or women until nephritis or diabetes over takes them; and the hope of the future, in so far as preventing the diabetes and other degenerative diseases is concerned, lies in teaching the children the simple facts regarding the quantity and quality of the food needed for perfect nutrition. Something is already being done in teaching personal hygiene, including diet and nutrition, in the schools and colleges, but we should not stop

until every boy and girl in the land, even before they enter the high school, shall have a working knowledge of the nutritional needs of their bodies.

Diabetes is as much of a public health problem as typhoid fever, but the death rates of the former have increased while the latter is being reduced everywhere. From the viewpoint of prevention, diabetes is largely a matter of diet, or personal hygiene, while typhoid prevention is largely a question of public hygiene. Our public health authorities and the medical societies should take up the fight against diabetes. They should confer with the educators and the school boards in their communities to the end that every private and public school and college everywhere shall give instruction in personal hygiene, particularly in diet and nutrition.

The organized medical profession can also help in the fight by giving the public the facts regarding the alarming increase in diabetes, while at the same time stressing the fact that it can be prevented by eating more green vegetables and more raw fruits and less meats, less white bread and less sweets. Since the public has learned of the use of insulin, people generally are interested in the subject of diabetes; and now is the psychological time to begin the campaign for its prevention. Will the medical profession live up to its opportunities in preventing diabetes, as it has done so nobly in the fight against communicable diseases?

Empire Building.

THE TREATMENT OF DIABETES WITH DIET AND INSULIN.*

By ELLIOTT P. JOSLIN, M. D., Boston, Mass.

The necessity for the treatment of diabetes by physicians generally rather than by specialists is apparent when one considers that one death out of fifty in Boston and New York is from diabetes. Exactly how common the disease is in the country, it is difficult to determine. It is probably safe to say that there exist today at least one million individuals who either have diabetes or will develop it before they die.

The cardinal causes of death of my diabetics have been four: diabetic coma, cardio-renal with vascular disease, infections, and tuberculosis. Coma has been responsible for the death of fifty-one per cent of 887 of my fatal cases, cardio-renal with vascular disease seventeen per cent, infections sixteen per cent, and tuberculosis six per cent. During the last four years thirty-three deaths have occurred in hospitals, and the reasons for a fatal issue in this hospital group are so different that they challenge atttention. Coma and infections have changed places. The mortality from coma has dropped to twenty-one per cent and the mortality from infections has risen to forty-five per cent. The reduction in the percentage of deaths from coma is attributable to (1) a diet low rather than high in calories and qualitatively regulated, (2) prompt inauguration of certain prophylactic and preventive measures in patients liable to coma, and (3) insulin. On the other hand, the proportionate increase in the percentage of deaths from infections is explained chiefly by the deaths from gangrene of the lower extremities and secondarily from other infections, both general and local.

The diet in diabetes should be moderate in quantity. Excess in food is the most common precursor of diabetes, and it is therefore irrational to continue what has already proved harmful. For this reason the first step taken with patients beginning treatment should be to curtail the amount of food. Examination of Table I shows that upon the first day of the test diets (T. D. 1) the calories have been reduced to 1,304 calories, which are about two-thirds of the average calories taken by an adult weighing 154 pounds (70 kilograms). As a matter of fact, in practice I usually begin with test diet two (T. D. 2), which amounts to 931 calories. If this reduction in calories does not result in making the patient sugar free, advance is made to lower calories, which are found in test diet three and test diet four. As will later be shown, with the use of insulin one seldom needs to employ test diet four with its few calories or the next diet below it, and also below the line, with a still smaller number.

Reduction in carbohydrates accompanies the lowering of calories in the test diets employed to get the urine of the diabetic sugar free. If the patient is passing very large quantities of sugar in the urine, one can begin with test diet one, though usually one commences with test diet two, which contains about 100 grams carbohydrate. After one day of this diet, one can proceed to test diet three, with 66 grams

*Read by invitation as part of the Symposium on The Pancreas, at the fifty-fourth annual meeting of the Medical Society of Virginia in Roanoke, October 16-19, 1923.

TABLE I.

INSULIN DIABETIC DIETS.

	Diets	Total Diet				Carbohydrate (C)						Protein and Fat (PF)					
		Carbohydrate	Protein	Fat	Calories	5% Vegetables	Orange	Oatmeal	Shredded Wheat	Uneeda	Potato	Egg	Cream 20% fat	Bacon	Butter	Meat	
TEST	T.D.1	181	46	44	1304	300	300	---	3	4	240	3	120	---	---	---	1
	T.D.2	101	35	43	931	300	300	---	1	2	120	3	120	---	---	---	2
	T.D.3	66	24	37	693	300	300	---	½	2	---	2	120	---	---	---	3
	T.D.4	34	15	30	466	300	200	---	---	---	---	1	120	---	---	---	4
MAINTENANCE	C1+PF1	14	15	30	386	300	---	---	---	---	---	1	120	---	---	---	1
	C2+PF2	22	19	37	497	300	100	---	---	---	---	2	60	---	15	---	2
	C3+PF3	32	24	37	557	600	100	---	---	---	---	2	60	---	15	---	3
	C4+PF4	42	29	52	752	600	200	---	---	---	---	2	60	30	15	---	4
	C5+PF5	52	32	66	930	600	200	15	---	---	---	2	60	30	30	---	5
	C6+PF6	64	44	83	1179	600	200	30	---	---	---	2	120	30	30	30	6
	C7+PF7	74	52	88	1296	600	300	30	---	---	---	2	120	30	30	60	7
	C8+PF8	84	61	94	1426	600	300	30	---	2	---	2	120	30	30	90	8
	C9+PF9	98	65	106	1606	600	300	30	½	2	---	2	180	30	30	90	9
	C10+PF10	109	66	119	1771	600	300	30	1	2	---	2	180	30	45	90	10
	C11+PF11	135	80	135	2075	600	300	30	1	2	120	2	240	30	45	120	11
	C12+PF12	159	84	135	2187	600	300	30	1	2	240	2	240	30	45	120	12

carbohydrate, and so on to test diet four upon the next day unless the Benedict test is negative. In former days still lower carbohydrates and less calories were frequently required to banish the urine sugar and even a day of fasting would occasionally be interpolated, and thereafter one would progress day by day, C^2PF^2, C^3PF^3, etc., increasing the diet in both calories and carbohydrate until sugar reappeared. Then one would drop back a line or two (10 to 20 grams) in carbohydrate and adjust protein and fat by increasing the protein fat (PF) number. Today insulin shortens the stay, and one often jumps from T. D. 3 to C^6 PF^6, which contains nearly the same amount of carbohydrate, but distinctly more protein and fat.

The above system of gradually reducing the total calories and the carbohydrate until the urine of the patient becomes sugar free, and thereupon gradually raising the carbohydrate until the carbohydrate tolerance is obtained and then making any necessary adjustments of protein and fat, accounts for the lessened prevalence of coma in hospital patients.

Under-nutrition is the keynote of all modern diabetic diets. I have laid emphasis on lowering of fat, Newburgh and Marsh on lowering of carbohydrate, and Petrén especially on lowering of protein, but all are indebted to Allen for a preliminary lowering of total calories.

The protein requirement is fundamental. For a young child 2 or 3 grams per kilogram are desirable, for a youth 1.5 grams, for an adult 1 gram, and after sixty it may be lowered to 0.66 gram per kilogram body weight. Not alone for maintenance of body tissue is the protein requirement fundamental, it is even more fundamental in severe cases to prevent acidosis. Protein underlies the proper balancing of fat and carbohydrate, the ketogenic-antiketogenic ratio. If the protein is 1 gram per kilogram body weight and only that amount of carbohydrate given which enables the patient to be sugar free, the fat may be raised to thrice the grams of carbohydrate. If necessary calories are not secured, the protein must be lowered to 0.66 gram per kilogram body weight and then the fat can be four or even five times the carbohydrate, provided the carbohydrate is so low as to eliminate glycosuria. Under either of these conditions there is no danger of acidosis, or, in other words, the ketogenic-antiketogenic ratio is not exceeded. The calories required for a patient depend first of all on maintenance of strength and weight. They seldom vary far from 30 per kilogram body weight in adults, but children may require twice as many. The foods which make up the diet of the diabetic should not be too varied. Otherwise they are confusing for both doctor and patient to estimate in carbohydrate, protein, and fat values. After demon-

strating ability to keep sugar free on standard foods, the patient may experiment with them. My patients usually confine their dietetic reckonings to the foods shown in Table II. My aim is to make the routine diet as simple as possible.

TABLE II.

FOODS ARRANGED APPROXIMATELY ACCORDING TO CONTENT OF CARBOHYDRATES.

Water, Clearbroths, Coffee, Tea, Cocoa Shells and Cracked Cocoa Can be Taken Without Allowance for Food Content.

	5%		10%	15%	20%
*Reckon average carbohydrate in 5% veg. as 3%—of 10% veg. as 6%.					
VEGETABLES (fresh or canned)	1%-3%	3%-5	10%	15%	20%
	Lettuce	Tomatoes	String Beans	Green Peas	Potatoes
	Cucumbers	Brussel Sprouts	Pumpkin	Artichokes	Shell Beans
	Spinach	Water Cress	Turnip	Parsnips	Baked Beans
	Asparagus	Sea Kale	Kohl-Rabi	canned	Green Corn
	Rhubarb	Okra	Squash	Lima Beans	Boiled Rice
	Endive	Cauliflower	Beets		Boiled Macaroni
	Marrow	Egg Plant	Carrots		
	Sorrel	Cabbage	Onions		
	Sauerkraut	Radishes	Green Peas,		
	Beet Greens	Leeks	canned		
	Dandelions	String Beans,			
	Swiss Chard	canned			
	Celery	Broccoli			
	Mushrooms	Artichokes			
FRUITS	Ripe Olives (20% fat)		Strawberries	Raspberries	Plums
	Grape Fruit		Lemons	Currants	Bananas
			Cranberries	Apricots	Prunes
			Peaches	Pears	
			Pineapple	Apples	
			Blackberries	Blueberries	
			Oranges	Cherries	

1 gram protein, 4 calories.
1 gram carbohydrate, 4 calories.
1 gram fat, 9 calories
6.25 gram protein contain 1 g. nitrogen.

1 kilogram=2.2 pounds.
30 grams g. or cubic centimeters c.c.=1 ounce.
A patient "at rest" requires 25 calories per kilogram

30 Grams 1 oz. Contain Approximately	Carbohydrates G	Protein G	Fat G	Calories
Vegetables 5%	1	0.5	0	6
Vegetables 10%	2	0.5	0	10
Shredded Wheat	23	3	0	104
Uneedas, two	10	1	1	53
Potato	6	1	0	28
Bread	18	3	0	84
Oatmeal, dry weight	20	5	2	118
Oysters, six	4	6	1	49
Milk	1.5	1	1	19
Meat (cooked, lean)	0	8	5	77
Fish	0	6	0	24
Chicken (cooked, lean)	0	8	3	59
Egg (one)	0	6	6	78
Cheese	0	8	11	131
Bacon	0	5	15	155
Cream, 20%	1	1	6	62
Cream, 40%	1	1	12	116
Butter	0	0	25	225
Oil	0	0	30	270

Thomas Groom & Co., Inc., 105 State St., Boston.

Education of the patient in the prevention of coma is the second factor which has reduced my coma mortality. Patients have been taught for some years, whenever they feel "sick," I seldom say "ill," (1) to go to bed, (2) to take a cupful of hot liquid every hour, hot water, coffee, tea, broth, water-oatmeal gruel, or, instead of the gruel, orange juice, (3) to get a nurse in order to conserve strength and save burning body calories, (4) to keep warm, (5)

to take an enema, and (6) to call the doctor. In other words, they are taught to regard any indisposition as premonitory of coma. They are not to diagnose their cases.

The first function of the doctor when he arrives is to diagnose the coma. A diabetic can have coma from acid poisoning, but his coma may be due to apoplexy, uremia, morphine, septicemia, meningitis, trauma, or hypoglycemia. Indeed, the doctor who is called to a case of coma in a diabetic must use every scrap of medical knowledge and skill with which books and experience have endowed him. Insulin is useless in all comas save those due to acidosis, and the physician must beware.

If the diagnosis of diabetic coma is established, the second function of the doctor is to give insulin, and the technic will be described shortly. His third duty is to provide by subcutaneous injection of salt solution a sufficient amount of liquid for the patient by which acid bodies can be excreted. A quart of salt solution given subpectorally ensures a supply of liquid in contrast to its precarious administration by mouth or rectum, whereby it is often expelled. Support of the heart is a fourth requirement, and this is accomplished with digitalis and caffein. Frequently, and especially in children, there is a fifth indication: namely, gastric lavage. Dilated stomachs are by no means infrequent and such are dangerous, not alone because they deprive the tissues of needed fluid, but also because of reflex action upon the heart. A sixth demand upon the doctor arises only in the event of a fatal issue. Then an autopsy is essential, first to establish the diagnosis and second to afford an opportunity to secure information which will help in the treatment of another case.

It is fitting thus to discuss the dietetic treatment of diabetes which has been built up through the ages with laborious effort, and the prevention of coma which the last generation has developed, because without this knowledge insulin therapy would be not only futile, but often fatal.

Insulin has allowed forty-six out of forty-eight children coming under my care August 7, 1922, or later, to be alive at the end of twelve months. I need say no more for its efficacy. One of the two deaths resulted from the omission of the insulin by a child who kept on eating the enlarged diet which its use had afforded. After five days he chanced to develop an infection, which always makes any diabetes more intense, and he shortly went into coma and died within seven hours of admission to the hospital. Such a death should be preventable. This is one danger connected with insulin therapy. The other death was that of a child reported to be in coma about 100 miles from Boston whose transfer to the hospital did not begin until some twenty-four hours after permission was given for admission. She also lived about six hours following arrival. Such a case would far better have been treated at home. The insulin should be taken to the patient rather than the patient to the insulin.

An overdose is the second danger one encounters from insulin. This is known as a reaction and is associated with a lowering of the percentage of blood sugar below the normal level, 0.10 per cent. So soon as the blood sugar falls below 0.08 per cent, certain definite symptoms appear, and perhaps the first notable symptom is extreme hunger. As the blood sugar falls to this figure, perspiration, which is often apparent upon the forehead, and tremor develop. If the blood sugar reaches 0.045 per cent or below, unconsciousness usually develops and may be accompanied by convulsions.

Perhaps not over two of the less than 100 reactions, which have occurred in the course of more than a year with my patients, have been accompanied by unconsciousness. This I ascribe to the use of small doses of insulin.

The antidote to a reaction from insulin is the administration of glucose. Commonly this is taken by the patient in the form of orange juice. It may be taken as corn syrup or actual sugar, because most sugars turn to glucose immediately upon ingestion. With children the syrup or honey may be given when it is difficult to administer more liquid foods. Ten to fifteen grams of glucose suffice as a rule to banish the symptoms of a reaction and the antidote may work within five minutes. Adrenalin acts similarly, and 10 minims of a 1-1000 solution injected subcutaneously act promptly. One should be somewhat cautious, however, in the administration of adrenalin to be sure that there is enough available carbohydrate in the body to allow it to be mobilized.

The first dose of insulin administered to a patient at the New England Deaconess Hospital is usually 1 unit, and this is increased by 1 unit before each meal until by the fifth meal the patient is taking 5 units before a meal.

Thereafter 5 units are given about twenty minutes before each meal. At the same time the changes in diet take place which have been outlined above, because treatment with insulin should work hand in hand with treatment with diet. If the urine of the patient does not promptly become sugar free, the dose is changed to 6 units before a meal or even 7, 8, 9, 10, or more units. So soon as the urine becomes sugar free, then the noon dose is usually omitted and the total dose divided into two doses, that before breakfast being somewhat larger than that before supper.

If the patient remains persistently sugar free upon a maintenance diet, the attempt is made to omit the evening insulin by gradually decreasing the dose by 1 unit every one or two days, and in a good many cases this is possible. Then one attempts to lower gradually the morning dose. As a matter of fact, about ten per cent of my cases treated with insulin have been able to omit it entirely.

Small doses have characterized my method of treatment. In fact, at the close of the first year of insulin medication there were but about 20 out of 300 diabetics taking insulin who were receiving 30 or more units of insulin daily. Insulin is in its infancy, and it has seemed advisable to proceed slowly with it. As a rule it has been necessary to increase the dose somewhat as time has elapsed.

The morning dose of insulin should usually be the largest administered during the day, and, conversely, the quantity of carbohydrate at breakfast should usually be the lowest. These rules, however, are not invariable. Before changing the dose of insulin it is always desirable to determine whether the carbohydrate is properly divided at the different meals. For this purpose single specimens of urine throughout the day should be tested qualitatively and the results balanced against the dosage of insulin and the intake of food. Patience and study often will obviate the necessity for an increase in insulin.

The test of single urinary specimens during the twenty-four hours is of the greatest value in the treatment of diabetes, and its importance has been especially urged by my associate, Horace Gray. By this method general practitioners can treat satisfactorily many cases of diabetes without blood sugar determinations, and the advantage of this is obvious. In fact, it is because of the possibility of watching the effect of insulin in this manner that I have felt it safe to urge the use of insulin by doctors throughout the country.

Diabetic coma requires larger doses of insulin, but before insulin is given to any patient with coma, the doctor must assure himself that the type of coma is really that due to acidosis and not due to apoplexy, uremia, meningitis, septicemia, morphine, or trauma. When the diagnosis of diabetic coma is assured, then insulin should be administered immediately and best intravenously for the first dose, though that is unessential. It is safe to give 10 units every hour and usually safe to give 15 units hourly for the first three hours. Fifteen units of the new insulin equal 21 units of the old, so dosage creeps up rapidly. One continues to give insulin in hourly doses until the hourly specimen of urine becomes sugar free or, if available, the blood sugar drops to nearly normal. It is essential each hour, before administering the insulin, to test the urine. Otherwise, severe reactions may be encountered. Following the commencement of recovery, insulin should be continued at less frequent intervals. It should not be permanently omitted. If this is done, a relapse may occur. Each case is a rule unto itself.

Gangrene, directly or indirectly, led to the death of twenty-three per cent of Boston's diabetics between 1895 and 1913 and is the next important preventable diabetic cause of death. Any diabetic above the age of fifty years should be cautioned against the possibility of developing gangrene. He should be warned of its dangers and should be told to protect his feet against injury by new shoes, hot water bags, trauma, and from careless treatment of toenails and corns, and of the necessity of reporting the slightest injury to his physician. Each physician should take pride in freedom from gangrene among the diabetic patients who consult him. He should be as zealous to protect all his patients from gangrene as from typhoid fever.

The surgical treatment of gangrene brings up the question of preparing diabetic patients for operation. With the advent of insulin, it is now safe to say to the surgeon that so soon as the lesion in question should be treated surgically, it is possible to have the patient ready for the operation. Food should be given in simple form, such as oatmeal gruel or orange juice, up to within three or four hours of operation, be-

cause so often patients do not eat for some hours after they leave the operating table, and consequently they are in a position to develop acidosis of greater or lesser extent. Water-oatmeal gruel and orange juice are the foods generally advised, because these are well borne by the stomach, and furthermore patients seldom will get in these two forms of food more than 50 grams of carbohydrate in the twenty-four hours after an operative procedure. Along with the food, insulin may be continued as heretofore with that particular case, although slight changes in the dosage may be necessary. Formerly none of my patients were operated upon with ether, but with insulin the surgeons are beginning to employ it again. However, all the amputations in the gangrene cases and all the prostatic operations for many months have been conducted under spinal anesthesia.†

81 *Bay State Road.*

A SYSTEM FOR THE USE OF INSULIN WITH THE DIABETIC DIET IN GENERAL PRACTICE.*

By WARREN T. VAUGHAN, M. D., Richmond, Va.

There can be no doubt that the more satisfactory plan of treatment for the diabetic is with hospitalization, and instruction by a qualified internist, or better a specialist in diabetes. Those who can afford this will obtain maximum therapeutic success, but we must at the same time consider how best to provide for that large number of individuals who for financial or other reasons cannot obtain hospital treatment and instruction. Those best qualified to discuss diabetes, while stressing the obvious advantages of carefully controlled scientific therapy, recognize the necessity of aiding the greater number who must do as well as they may under the guidance of the family physician.

It is undoubtedly for this reason that Joslin has spent years simplifying the technic of therapy, in the elaboration of his diet cards for the use of the general practitioner. That such efforts have met with success is shown by his observation that in Boston, for example, the average life of diabetics treated at home has been increased and the incidence of complications, such as coma, decreased quite in proportion to similar improvements noted under the best hospital or class instruction. We may state with assurance that the treatment of diabetes by the medical profession in general has improved greatly with under-nutrition therapy. We may state with equal assurance that, except where the family physician has become especially interested in this disease or has received some post-graduate instruction, many of his patients are not treated as thoroughly or as systematically as they should be.

With the advent of insulin, the question arises whether treatment can be carried on at home with such a degree of success as to compare favorably with the results at the hands of the specialist. This much is certain, that for successful dietary or insulin therapy the patient or his physician, or preferably both must receive thorough preliminary instruction. This having been obtained the further treatment must be so systematized and simplified that it can be continued with a minimum of doubt or misunderstanding. Insulin has to a great extent rendered starvation treatment unnecessary but it has at the same time made accurate dietary regulation even more important. For this reason a new series of charts and tables must be evolved. The present paper deals with a system which the writer has found satisfactory for his own use, and which the patient, after discharge, carries out at home under the guidance of his physician.

A brief recapitulation of the general principles of insulin treatment is necessary, before we pass on to consideration of routine therapeutic measures. Because of limited time we must content ourselves with discussion of the average uncomplicated case.

Optimal Diet. The diet even under insulin should be no more than sufficient for the patient's metabolic needs. No attempt should be made to fatten patients needlessly. Theoretically the diet may be increased to any desired amount, provided sufficient insulin be administered and provided the proper balance between protein, fat and carbohydrate be maintained. It should not, however, be increased beyond such levels as will satisfy reasonable normal demands for energy. There are several reasons for this. Increased caloric intake causes increase of metabolic rate. This in turn calls for more food. There develops a more pronounced tendency towards hyperglycemia.

†A demonstration was given of a simple and accurate method for the quantitative determination of sugar in the urine. The apparatus is quite inexpensive and can be purchased of Emil Greiner & Son, 55 Fulton St., New York City.

*Read at the fifty-fourth annual meeting of the Medical Society of Virginia at Roanoke, October 16-19, 1923.

Increased intake necessitates more insulin and more frequent injections with consequent greater liability towards hypoglycemic reactions. Furthermore, if the patient who has attained a certain degree of obesity suddenly finds himself unable to procure his insulin, there is real danger of resultant acidosis. Extreme under-nutrition is no longer necessary, but moderate under-nutrition still appears preferable to hypernutrition.

In general a food intake of about 2,000 to 2,600 calories may be allowed in the average adult case. One man may attend to his daily duties with 2,000 calories while a larger man doing heavier work may require more. From the economic viewpoint a certain individual may do more efficient work with larger doses, thereby increasing his earning capacity. In such a case, the increased amount spent on insulin may even be a good investment. Accuracy of control is another factor. Thus Allen and Sherrill point out that a child of wealthy parents who will always be attended by a specially trained, highly intelligent nurse, may be fed more abundantly than another child treated on a charity basis who will ultimately have to carry the responsibility of his own treatment at home.

Insulin Dosage. The average unit is considered as metabolizing 1 — 1.5 grams of glucose. Occasionally one unit will reduce glycosuria by as much as three grams.* The ratio varies in practical work with the individual patient and particularly with the extent of glucose retention. When at the beginning of treatment the blood sugar is high and there is consequent greater concentration in the tissues, larger quantities of insulin are required to render the patient sugar free than is later necessary to keep him so. Thus in one case on a steady diet we have reduced the daily insulin dosage from fifty to twenty-five units.

In acidosis or coma, or with superimposed infections, the dose required is greater than without such complications. Most observers have found that in the average case from ten to thirty units are necessary to maintain the patient in equilibrium. As much as seventy units have been given daily.

My own dosages have varied between two and fifty-five units per day. An adult requiring but five units daily, whose blood sugar is not materially elevated, will often do as well with slightly increased dietary restriction and the omission of insulin. In the case of growing children, on the other hand, it appears better to provide sufficient food to meet normal growth requirements, and to supplement with the insulin. I have also been giving small dosages of five units to a group of very mild diabetics in an attempt to permanently raise the sugar tolerance in the extremely early cases.

Woodyatt has developed a relatively simple system of dosage determination. On a basal diet he establishes a daily excretion of sugar. Thus if the individual excretes steadily twenty-five grams of glucose, twenty units will about render him sugar free. He then receives one-half of this calculated dose. This dose is increased by five units daily, and later the caloric intake is gradually increased to the desired amount.

Frequency of Administration. Opinion differs quite remarkably as to the number of injections that should be given each day. Allen and Sherrill advocate three injections, and even four in case the blood sugar rises at night. Joslin, Gray and Root as well as Banting, Campbell and Fletcher report satisfactory results from two doses. In mild cases the latter give a single daily dose before one meal in which most of the carbohydrate has been concentrated. Wilder and his associates obtained best results with single injections of the entire amount thirty minutes before breakfast, and with food distributed equally between the three meals. This was particularly so when the dosage did not exceed thirty insulin units. As a rule, the second meal comes early enough to neutralize any severe late effect on the blood sugar level. Woodyatt has practically eliminated multiple daily doses and in ninety per cent of all cases administers a single morning injection. Rarely he gives two doses a day. This of course does not apply to complications such as acidosis or coma.

Wherever possible I have used a single morning administration with food divided evenly between the three meals. In this way I have given as high as fifty-five units in a single dose without hypoglycemic reaction. This was in an individual exhibiting an unusually slow fall in glycemic level after injection. However, she did better and required less insulin when the insulin was divided into two doses. My experience also has been that where the

*On October 15, 1923, the strength of the standard unit was increased 40 per cent.

daily dosage exceeds twenty units, it is better given in divided doses. I give the major proportion before breakfast and a smaller amount before the noon meal, occasionally before the evening meal. Theoretically, it may be better to give three or even four injections daily, but in actual practice few patients will submit indefinitely to this number of needlings each day.

Must the Patient be Maintained "Sugar Free?" With few exceptions the urine should be maintained sugar free. Blood sugar well above normal provides some protection against the occurrence of hypoglycemia and also allows greater economy in the use of insulin. On the other hand, hyperlycemia may be a factor in the degenerative processes such as arteriosclerosis, optic neuritis and so on, and probably throws a greater load upon the islet tissue of the pancreas. Joslin, Gray and Root brought an average fasting blood sugar of 0.24 per cent down to 0.19 per cent at the end of treatment.

Hypoglycemia. The reaction of greatest importance following insulin results from too rapid or too great fall in blood sugar level, with resulting hypoglycemia. The symptoms are well known to all who have used insulin. Symptoms may develop with a sugar level as high as 80 milligrams per 100 c.c. The level at which symptoms appear varies in different individuals and at different times. Symptoms usually become pronounced at 60 to 50 milligrams. A glycemic level of 35 mg. per 100 c.c. is usually accompanied by unconsciousness. Reaction usually occurs two hours after administration but may be delayed. Joslin observed hypoglycemic symptoms after one insulin unit in a man with tolerance for 114 grams of carbohydrate, but who was weakened by diarrhoea. Allen has observed a reaction after one-half unit in an individual extremely weakened and emaciated, on a low diet. Heavy exercise increases the tendency to hypoglycemia.

Treatment consists in the administration of glucose, usually by mouth. Orange juice is very successful. Other sugars than glucose are not as highly recommended. If necessary, glucose may be adminstered intravenously. Hot tea or coffee and beef extracts produce temporary relief but no increase in blood sugar concentration and are followed by relapse. As a rule there is no recurrence after the administration of glucose. Often five grams will tide a patient along till the next meal. Twenty grams are frequently administered. Epinephrin is recommended in unconsciousness. This apparently causes a mobilization of tissue sugars into the blood. Such treatment must be followed by the giving of orange juice or some preparation containing a moderate quantity of dextrose.

Does Insulin Produce a Permanent Increase of Tolerance? Uppermost in the minds of all since the advent of insulin has been the question—"will its administration produce permanent cure?" It is still too early to prognosticate remote results, but the studies in general do not indicate permanent improvement in sugar tolerance. Although several cases have acquired some increased ability to metabolize glucose, the vast majority cannot cut down the amount of insulin as time goes on.

The foregoing principles cover only the more important phases of treatment. They serve, however, as the ground work for a routine plan of treatment. Complications, including acidosis, have not been considered, since they require highly individualized treatment and accurate laboratory control. In the absence of tables such as Joslin has prepared for undernutrition therapy I have found that Wilder, Foley and Ellithorpe's Diabetic Primer satisfactorily fills the patient's requirements. Two editions have appeared and the daily diet lists appearing in the second are quite different from those of the first. The chief variance is in their higher fat content. It has been my experience that a mild diabetic does better on the relatively lower fat diets in the first edition, while some of the more severe cases, during the period of observation at least, do better on the higher fat diets. It is to be regretted that both series of diets were not incorporated in the second edition. To be sure the ketogenic-antiketogenic ratio of the high fat diets is within safe limits, but the large fat content often becomes distasteful to the patient. This is not the case with those diets found in the first edition of the book.

It is absolutely essential for success that the patient weigh his food and examine twenty-four hour urine collections, daily at first and at frequent intervals later.

Blood sugar determination is not indispensable in the treatment of a diabetic. However, a knowledge of the glycemic level at the beginning of treatment is most valuable and les-

sens the risk of hypoglycemia. It is also more satisfactory to know the glucose content of the blood after the urine has become sugar free.

The following program of treatment has proven satisfactory in my hands:

1. The patient procures and studies the Diabetic Primer, purchases scales, and learns to test his twenty-four urine collections qualitatively for sugar.

2. He is weighed and a general examination is made together with the necessary laboratory studies, including alveolar carbon dioxide tension determination. The results of this study may modify the plan of treatment.

3. After the twenty-four hour output of sugar has been quantitated, the patient is placed upon that diet in the Primer which should keep him in metabolic equilibrium without providing an excess of nourishment.

4. After two or three days on such a diet with daily sugar determinations, insulin administration is started, following very much the plan recommended by Woodyatt. Approximately one-half the calculated quantity of insulin necessary to render the patient sugar free is given on the first day and the amount is increased steadily each day, usually by five units, until sugar no longer appears in the urine. The drug is given in a single morning dose, preferably before breakfast.

5. Careful watch is maintained for acidosis or other complications, throughout the treatment by frequent physical examinations, regular urine studies, and, when necessary, repeated alveolar carbon dioxide tension determinations.

6. After the patient has become sugar free, and unless he be overweight, the diet and insulin dosage are adjusted so that he may maintain his weight.

7. A blood sugar determination at the end of the period of standardization will show the influence of treatment on the glycemic level and will indicate whether the amount of insulin should be further increased.

It has been my experience that if more than twenty units of insulin are to be administered, better results are obtained in broken doses. I customarily give the major portion before breakfast and a smaller amount before the noon or evening meal.

With the use of the special recipes and the food tables in the back of the Diabetic Primer, substitutions in the proper amount can be made for practically any of the foods in the regular diet lists, so that the patient may eat those foods which are in season, or in fact nearly whatever he desires, provided the quantity thereof is properly regulated.

Contrary to the opinion of many, I find that in the absence of complications, instruction and treatment are more satisfactory if the patient is not placed in the hospital. From the beginning he works out his routine at home, where he will eventually have to be under any circumstances, and his results are discussed and his problems clarified in daily consultations at the office.

Medical Arts Building.

DISCUSSION OF PAPERS BY DRS. HOUGH, GRAVES, SMITH, OWNBEY, HARRIS, JOSLIN AND VAUGHAN.

DR. L. G. PEDIGO, Roanoke: I am very much interested in this subject, and want to ask one or two questions for information. I notice that the discussion is one confined to diet and insulin treatment. I want to know if this treatment is found to be incompatible with anything that has been found advantageous in the treatment of diabetes. At one time appendicitis, then gall-bladder condition, occupied the footlight, then high blood pressure; now everything from headache to a revolution is attributed to the teeth. What I want to know is whether insulin treatment is incompatible with anything else, the salicylates, for instance. The insulin is not new in so far as I can discover, as some twenty-five years ago it was used in hospitals in Europe, being used in the form of liquid extracts from the pancreas of healthy animals. Brown and Sequard wrote excerpts in the lower '90's that glycosuria could be checked down by the liquid extracts used hypodermically. Is insulin incompatible with the salicylates von Luren used with such success?

DR. STUART MCGUIRE, Richmond: I can add nothing of value to the discussion of the papers just read, but I rise to say how much I have been interested and instructed by this symposium. I could not help but think how fortunate it was that it was scheduled for the general meeting of the Society. If it had been put in the medical section then I and other surgeons would not have heard it. I think the subdivision of our Society into sections has been a great mistake. Surgical men should hear medical papers and medical men should hear surgical papers. If I had the authority, I would limit the number of papers on the program of our annual meeting and go back to the old plan of having all papers read in one general session. If this plan is not practical I would advocate requiring the surgeons to attend the medical section and medical men attend the surgical section, then we would all learn something instead of hearing as we do now the same old things over and over again.

I was very much amused at Dr. Harris' story of the Jew drummer he had lunch with on the dining car on his trip to Roanoke and his expert analysis of the food he ate. Jews as a rule are abstemious in the use of alcohol but consume large quantities of rich food, which explains why so many of them have diabetes. If the drummer in question had known Dr. Harris' identity, he might have been as much embarrassed as I was when, coming back from France on an Army transport, I sat next to Dr. Joslin at table. The trip took three weeks and I enjoyed his

companionship very much but I never got over the feeling that he was calculating the value in calories of all the food I consumed.

I want to take advantage of this opportunity to say that both Dr. Harris and Dr. Joslin did spendid work in the Army and that they made as good military officers in time of war as they now make medical experts in time of peace.

DR. R. B. JAMES, Danville: Dr. Pedigo made a very good point for the average practitioner who cannot carry out the insulin treatment, which is not possible for the poor patient. Dr. Pedigo speaks of the pancreatic extract. Twenty-five years ago these were used extensively and with good results but we do not hear so much of them today. There are certain cases, however, that cannot be controlled by diet and pancreatic extract and these heretofore have been hopeless cases but insulin seems to offer them relief. Most cases can be kept comfortable by diet alone, others by diet and the pancreatic extract. I have three cases now that are doing well under this treatment. Salol, the salicylates and other intestinal antiseptics helped in many cases, but I have found none so good as the pancreatic extract.

DR. EDWARD SANDIDGE, Amherst: At what stage should diabetics be given this insulin? If you have a patient in good health apparently, with no symptoms of diabetes—no nausea, no dryness of skin—except glycosuria which is generally worse before menstrual period, would you give insulin when she shows no symptoms of diabetes, otherwise?

DR. E. E. WALKER, Phenix: Can sugar occur in the blood without showing a trace in the urine? Suppose a man is to have some sugar today, then would have more by eating a certain food, will insulin get that out?

DR. THEODORE HOUGH, University: Just one point I should like to clear up in closing—the point referred to by Drs. Pedigo and James, that in times past pancreatic extracts have been used, and possibly at times with beneficial effects. It is equally true that they have much more frequently been used without any effect and we know why this is so.

Both gastric juice and pancreatic juice have been shown to destroy insulin, the active agents in each case being the proteolytic ferments. Ordinary extracts of pancreas usually contain active trypsin; sometimes they do not. Some of these extracts may, therefore, possibly have been effective; but usually the insulin had been destroyed by the trypsin.

DR. SEALE HARRIS, Birmingham, Ala.: Aside from the great honor of an invitation to address you, it is worth the trip from Birmingham to have heard this symposium on diabetes. All of the papers and discussions have been greatly enjoyed, particularly the one by Dr. Hough which is a classic, and of course, Dr. Joslin's address is the great feature of the occasion.

In the diet of diabetes it is not only important that the patient should understand diabetic arithmetic thoroughly, that is, he should know the exact amount of proteins, fats and carbohydrates that he should have for each of his three meals, he should also be taught the facts regarding vitamins. We recently had a patient who came to us for insulin and on examining him we found that he was well advanced in tuberculosis which undoubtedly had developed since he had been placed on a low diet for diabetes. He knew exactly the number of grams and calories of carbohydrates, fats and proteins that he should take and had kept himself sugar free for more than two years but he did not like butter and milk, the principal source of vitamin A. I think it is quite definitely proved that vitamin A is the great protector against tuberculosis and other respiratory infections, and I believe had this patient been taught that milk, cream, and butter are the principal sources of vitamin A, he would not have developed tuberculosis.

Dr. Hough spoke of the credit which has been given the discoverer of insulin but not enough credit had been given to many others who have made great scientific discoveries. I agree with him that physicians who have made great discoveries have not received the praise which they deserve but I do not think that Dr. Banting has received more than the credit which is due him for what I believe to be the greatest discovery in medicine for this century. Indeed, I have never seen anything finer in my life than Dr. Banting's attitude regarding his discovery and I know that he has not been responsible for the the publicity that has been given the discovery of insulin. He has given up the opportunity of great riches to accept the position as professor in the University of Toronto at $7,500 a year. He will not receive one cent for the manufacture or sale of his great discovery. In giving credit for the wonderful advance in the treatment of diabetes, I think we should not forget that it was the work of Lusk, Attawater, Sherman, Allen, Joslin, Woodyatt and others who made it possible for insulin to be of value in the treatment of diabetes. Indeed, if we did not know food values and the amount of glucose-forming foods that the patient is taking, insulin would be too dangerous to use. With the adjustment of diet to the patient's need and to the amount of insulin that is used, there is no danger in insulin.

One of the physicians spoke of the use of pancreatic extracts by mouth. I think it cannot be stated too emphatically that no pancreatic extract that has ever been manufactured, or that ever will be manufactured, will have any effect whatever when given by mouth; because insulin, the only pancreatic extract that affects carbohydrate metabolism, is destroyed by the gastric and intestinal juices. Banting told me that in the Toronto Clinic they had tried to use insulin by mouth, by enteric capsules, through a duodenal tube into the intestines, and by rectum, and with absolutely no effect whatever on the blood sugar level. He is absolutely sure that the insulin can never be used any other way than hypodermatically or intravenously.

DR. E. P. JOSLIN, Boston, Mass.: *Pancreatic extracts*: I have tried, besides insulin, two others and found that they did not work by mouth. Suppose you are giving insulin every day, then omit insulin and substitute an oral preparation. Perhaps no sugar will appear in the urine next day but, within five days after leaving off the insulin, the full form of the disease becomes manifest. Consequently, in testing any extract, one must wait at least five days.

I know of nothing which is incompatible with insulin.

I would not call a case of diabetes cured until a patient had lived at least twenty years. A woman in the hospital had a blood sugar of .09 per cent before a meal, 0.13 after meal. She appeared as if cured. When I increased her diet by twenty grams carbohydrate, the blood sugar went up to 0.19 per cent.

The cost of insulin is not great. Insulin is dropping in price and can be sold at a profit at two cents a unit, December, 1923. The average case does not take more than sixteen units. At the old price, buying wholesale for the hospital, it would cost forty-eight cents; by the new price, thirty-two cents, and even less, because now the unit is stronger. Is that too much? I have observed that the patient who

was too poor to pay for the treatment could smoke a couple of cigars daily. If a patient is doing well without insulin, do not give it. If a patient has no pain, one would not give morphine.

OPINIONS ON VARIOUS QUESTIONS IN GALL-BLADDER SURGERY, BASED ON ONE THOUSAND OPERATIONS.*

By STUART McGUIRE, M. D., Richmond, Va.
Surgeon to the McGuire Clinic.

During the past twenty years I have operated on more than one thousand patients for disease of the gall-bladder. Recently I have had the cases tabulated and studied with the hope of securing data which would enable me to prepare a paper that would be interesting and instructive. I thought my files contained satisfactory case histories, laboratory reports and operative findings of these cases, but I am mortified to confess that when the records were put to the crucial test of furnishing accurate statistics, they proved woefully deficient. A case report, which on casual reading appeared most excellent, would almost invariably be found to lack some essential detail when it came to tabulating facts in parallel columns, and I have completed my labors "a sadder and wiser man." I recognize now more fully than I ever did before the necessity of the campaign being carried on by the American College of Surgeons to standardize hospitals and to emphasize the importance of keeping full, accurate and systematic case records.

The following are some of the facts I have been able to learn from the study of my gall-bladder cases. The youngest patient in the series was thirteen, the oldest seventy-nine, the average age being forty-five. This confirms the accepted belief that no age is immune but the disease is more frequent about middle life. Seventy-one per cent of my patients were women and twenty-nine per cent were men. This confirms the statement that gall-bladder disease is about three times more frequent in women than in men. It is recognized that infection through the blood stream is probably the essential cause of cholecystitis, but stagnation of bile is an important predisposing factor and this condition is more common in women because of pregnancy, tight clothing, constipation, obesity and lack of fresh air and exercise.

All the cases in my series were white patients. I have done a great deal of surgery on negroes in thirty years of clinical teaching and, while I have operated on two or three mulattoes for gall-bladder disease, as far as I can recall I have never had a case of cholecystitis in a full blooded negro. Dr. Liek, of Dantzig, has recently written to find the relative frequency of gall-stones in the white and colored races in America and stated that the Germans have found practically no gall-bladder disease in the negroes in Africa. Dr. Phemister, of Chicago, referred the question to me among other Southern surgeons and in a second letter told me that the replies received showed that the disease was very rare in the colored race.

Some years ago I discussed the question of the frequency of cholecystitis and appendicitis in negroes with Dr. Wm. J. Mayo and I stated to him I had never seen a case of gall-bladder disease in a black patient. Dr. Mayo laughed and said that practically the only operations he had ever done on negroes had been for gall-bladder trouble. The explanation of the difference in our experiences may be the fact that Dr. Mayo's negro patients probably came from Chicago, while mine came largely from rural communities. I believe the Southern negro's fine teeth and immunity to diseases of the gall-bladder and the appendix are due to his good digestion. With changing conditions this will pass, and he will eventually acquire all the susceptibilities of our so-called modern civilization.

In the series of cases I now report gall-stones were present in seventy-four per cent of cases and absent in twenty-six per cent of cases. For some reason it is always gratifying to a patient and the family to learn after an operation that gall-stones had been found and removed. The larger the stone or the greater the number, the more the satisfaction. The surgeon, however, knows that the formation of gall-stones is merely an incident associated with gall-bladder infection. It is a fact that some of the most obviously diseased gall-bladders I have ever removed or drained contained no stones.

No one questions the propriety of removing a diseased gall-bladder although it contains no stones but what should be done if in operating on a supposed case of gall-bladder disease the surgeons finds, in the words of Willy

*Read at fifty-fourth annual meeting of Medical Society of Virginia held in Roanoke, October, 16-19, 1923.

Myers, "a seemingly normal, soft, bluish and glistening organ not harboring stones or presenting any adhesions whatever?" All of us have had such embarrassing experiences. In my early work I frequently contented myself in such cases with removing the appendix if it was present and closing the abdomen. Most of these patients did not get permanently better, thus justifying my diagnostic ability while condemning my surgical judgment. With increasing experience, and, fortified by the practice of my surgical friends, I now unhesitatingly remove these apparently innocent gall-bladders, provided the patient's clinical history points to gall-bladder disease, the search of the abdomen reveals no other cause for the symptoms, and the preliminary examination of the patient has excluded the possibility of stones in the urinary tract or other extra-abdominal conditions which might lead to error. As previously stated, in certain cases I have had cause to regret not removing an apparently normal gall-bladder and, since I have become more radical, whatever compunctions of conscience I may have felt at the operation table have been relieved by examination of the specimen in the laboratory, where small stones that could not be palpated were found or unquestioned evidences of infection were demonstrated.

My records in the series of cases reported do not show what percentage of patients were classed as acute and what per cent were classed as chronic at the time of admission to the hospital. They do show that only five per cent were acute at the time of operation. Many cases that were acute on admission were treated medically and classed as chronic at the time of operation. These figures bring up the very important question of when to operate in acute cases. This question has been settled for appendicitis, but not for cholecystitis. Will it be safer in an acute case to treat the patient medically until the virulency of the infection subsides and an operation can be done under more favorable conditions, or will it be better to operate at once and relieve pain, stop septic absorption and remove the danger of gangrene and perforation? Unfortunately, I have no figures that will help to settle this question. I can remember scores of acute cases that were kept in the hospital under medical treatment for one or two weeks and then safely operated on when the disease was quiescent. I can remember others whose symptoms were so urgent that an immediate operation was done and whose lives were undoubtedly saved by prompt intervention. On the other hand, I recall patients who apparently died because of delay who might have recovered if they had been promptly operated on, and others who apparently died because of undue haste who might have recovered if they had been first treated medically. There ought to be some general rule to guide us in these cases, but at present there is none, and the best a surgeon can do is to settle the question to the best of his ability in each individual case. Personally, I do not believe that infection of the gall-bladder presents an emergency at all comparable to infection of the appendix and, unless a case of cholecystitis is attended by symptoms that cause alarm, I am in favor of waiting until the acuteness of the infection subsides.

An analysis of the operations reported in this paper shows that the gall-bladder was drained in sixty-three per cent and removed in thirty-seven per cent of the cases. The series covers the work of twenty years, and in the first part of this period practically all the gall-bladders were drained, while in the last few years practically all of them were removed. The change from an almost routine cholecystostomy to an almost routine cholecystectomy was based not only on the altered opinion of the surgical profession but on personal experience as well. Cholecystectomy is certainly a more difficult operation to perform than cholecystostomy and at first it was hard to believe that it could be done with less risk to life, and that the patient would suffer no bad results from the sacrifice of the organ. With a little experience, however, I found the operation comparatively simple and safe. Convalescence was quicker and freer from complication and, most important of all, the patients remained well. My figures showed that eight per cent of the cases whose gall-bladder had been drained came back to the hospital for a second operation, owing to persistent fistulae, recurrence of gall-stones or symptoms due to adhesions, while practically all of the patients whose gall-bladders had been removed remained permanently well. I now do a cholecystectomy on all patients except those in which I drain for secondary pancreatitis, those whose general condition is so

bad from sepsis, cholemia or other causes that they will only bear the gentlest and quickest procedure, and those in which the gall-bladder and adjacent structures are so acutely infected that it seems safer to drain as a preliminary operation. Patients who are drained are warned that they may have further trouble and many of them are operated on a second time and the gall bladder removed before they leave the hospital.

Much has been written by the advocates and opponents of cholecystectomy with reference to the functions of the gall-bladder and the results of its removal. Few believe that the gall-bladder is important as a reservoir for bile as the amount it is capable of storing is small compared with the total secretion of the liver. Some attach importance to the fact that the composition of the bile in the gall-bladder varies from that secreted by the liver, in as much as it is more concentrated and contains a larger amount of mucus. Other writers believe the gall-bladder acts as a tension bulb, like the air chamber to a fire engine, to regulate the flow of the stream. It has been observed that after the removal of the gall-bladder there is a dilatation of the hepatic, the common and the stump of the cystic ducts, and this is thought to be an effort of nature to compensate for the loss of the gall-bladder. Bile pressure is dependent on the force of the secretion of bile by the liver and the resistance to the escape of bile by the sphincter muscle at the ampulla. The gall-bladder may act as a tension bulb to regulate the inequalities of bile pressure but, even if this is the case, its function is not a vital one, as proved by the large army of people who are well and happy despite the removal of the organ.

The average mortality of all the operations on which this report is based was 6.7 per cent. This is not high considering the fact that many of the patients were operated on during a period when surgery was not resorted to except as a last resort and at a time when present methods of technique were as yet undeveloped. The group of cases that showed the highest mortality were those with stones in the common duct where the death rate was ten per cent. The group showing the lowest mortality were the more recent cholecystectomies whose death rate was 2.7 per cent. As I look back over my results I am impressed by the fact, so often stated by so many men with reference to operations for so many diseases and conditions, namely, that early surgery is easy and safe and that late surgery is difficult and dangerous. This is especially true in gall-bladder disease. There is no such thing as innocent gall-stones. They all in time will give trouble and if the patient lives long enough will require operation. If an operation has to be done sooner or later, then the sooner the better. Every conscientious practitioner, when called on to consider whether or not to send a patient with gall-bladder disease to a hospital, should answer the question made familiar by a popular advertisement, "If eventually, why not now?"

The symptoms of gall stones are familiar to all of you and I will not weary you by dwelling upon them. The most important are the following:

Indigestion, not produced by imprudence in eating, coming on without definite relation to taking food and usually relieved by eructation or vomiting; *pain*, located in the epigastrium and radiating to the back or right shoulder blade; *tenderness* over the gall-bladder elicited by deep pressure; *colic*, abrupt in its onset, sudden in its relief; *jaundice*, occurring on an average of once in seven cases and more often due to cancer than to gall-stones; fever seen during acute exacerbations of infection and characterized by rapid rise and fall of temperature.

At one time it was thought that the irritation of gall stones almost invariably increased the acid contents of the stomach. It has been learned, however, that hypochlorhydria is as frequently found accompanying the condition as hyperchlorhydria and I now no longer place any confidence in the result of gastric analysis, except in excluding other conditions.

The value of X-ray findings is still a question under discussion. Gall-stones are not calcareous substance but are composed chiefly of fat, as can be proved by subjecting one to the heat of an open flame when it will soften and burn much like sealing wax. They do not cast a clear shadow as do urinary stones but are only visualized on the X-ray plate when they contain lime salts. Conscientious radiologists only claim to be able to show gall-stones in from thirty to fifty per cent of the cases where they are actually present. While a positive report is conclusive, a negative report in the words of Goldberg, "Don't mean anything."

Some X-ray men claim that a healthy gall-bladder does not show on the plate under ordinary conditions. Therefore, if a distinct shadow can be outlined, such gall-bladder should be considered diseased as its walls are thickened or its cavity filled with pathologic material. It is possible that the technique of pumping air into the peritoneal cavity will increase the value of the X-ray as a diagnostic help.

After the examinations have been completed to establish a diagnosis of cholecystitis, then an examination similar to that for life insurance should be made to see whether the patient is in condition for the operation. In addition to the usual test, the coagulation time of the blood should be taken, especially if jaundice is present. If the coagulation time is delayed, the patient should be given 5 c.c. of a ten per cent solution of calcium chloride intravenously for three successive days after the plan suggested by Walters of the Mayo Clinic.

If there are any evidences of myocardial weakness, a preliminary course of digitalis should be given. The evil of the old practice of purgation and starvation is now generally recognized by abdominal surgeons and should especially be avoided in these cases. This type of patients have usually had their intestinal tract thoroughly emptied by a dose of castor oil given before the X-ray examination, and all they need is a simple soap suds enema administered the morning of the operation. Food, especially of the carbohydrate type, should be given in as large quantities as the stomach will tolerate up to twelve hours before the operation and water should be forced up to the last moment. In debilitated cases it is often well to give a solution of glucose and soda before as well as after operation, by the Murphy drip method.

The patients are placed on the table in the simple horizontal position. I have tried various methods of angulation and many forms of pads or cushions under the back, but have given them up as they embarrass respiration and do not give better exposure.

The anesthetic I employ is gas-oxygen followed by ether. The use of the latter agent is necessary to produce the degree of relaxation required to examine viscera thoroughly without traumatism.

The incision I use is an upper right rectus beginning at the margin of the ribs and extending down far enough to give an ample field for operation. In a case of doubt as to whether a patient has cholecystitis or appendicitis, I do not make an incision over the appendix and palpate the gall-bladder, but make the incision over the gall-bladder and hook up the appendix, thus being able to inspect both. After the abdomen is opened, before I palpate or inspect the gall-bladder, I make a complete examination of the other abdominal organs unless there is some strong contraindication for doing so. If the patient is a woman, I first carry my hand down to the pelvis and determine the condition of the uterus, tubes and ovaries. I next bring the cecum up into the incision and as a rule remove the appendix. After the cecum is returned, I draw out and inspect the stomach and duodenum. I then examine the head of the pancreas and finally palpate the common duct with my thumb above and two fingers below, noting the size of its caliber, the thickness of its walls, the presence or absence of stones and whether there is evidence of infection as shown by the enlargement of adjacent lymph nodes. Only after this general survey of the abdomen is completed do I yield to the temptation to examine the gall-bladder itself. When the gall-bladder is exposed, its size, color, thickness of its wall, amount of distention and character of adhesions should be noted. Pressure should be made to see if it will empty and careful palpation carried out to find whether or not it contains stones. If these facts are all accurately recorded and afterwards compared with the patient's clinical history and laboratory reports, much useful information will be learned. In a good many recent cases where patients gave history of having had their gall-bladder drained medically by the Lyons method and who had reports of the character of the fluid removed, I found gall-bladders that could not be emptied by mechanical pressure and whose contents were totally different from that the so-called test would lead one to expect.

I usually remove the gall-bladder by clamping, cutting and ligating the cystic duct and artery and dissecting it free from above downward. The raw surface resulting is covered by sewing the divided edges of peritoneum together and a drain of soft rubber tissue is placed in position. I drain all my cases be-

cause if the drain does no good, it does no harm and I believe it is safer for the patient. It certainly saves me anxiety and makes me sleep better.

1000 *West Grace Street.*

SOME PRACTICAL POINTS IN THE DIAGNOSIS AND TREATMENT OF GALL-BLADDER DISEASE.*

By W. LOWNDES PEPLE, M. D., Richmond, Va.
Surgeon to McGuire Clinic.

It is an interesting thing to watch the emergence of any particular disease out of doubt and obscurity, and see its position established with assurance and certainty.

Many of us remember the position of the diseased appendix twenty or twenty-five years ago; how good men waited for days and pondered over a diagnosis which the patient himself often makes today. And so it is with the gall-bladder. Free discussion and interchange of thoughts and observations is making this subject clearer and clearer to us all, as time goes on and opinion crystallizes.

I think, however, we are still far less accurate in our diagnoses in the upper abdomen than in the lower, but we are getting more and more accurate as each year goes by.

In my work as a clinical teacher in the Medical College of Virginia, it has been my custom to go over and over the points of the differential diagnosis of the diseases of the abdomen in an extremely elementary manner, and I still find this routine of self-questioning to be a very good way of approaching any case of right-sided abdominal disease.

If the thumb of the right hand is placed along the lower right costal margin, the palm and extended fingers will cover an area of turbulence and trouble which I have called the "Balkans of Surgery." In this small area covered by the breadth of a hand we have some of the most perplexing problems with which the physician and surgeon are called upon to deal. Here lie, from above downward, the pylorus, the duodenum, the gall-bladder, the right kidney, the appendix, and the right ovary and tube in the female.

I know of no better way of arriving at a correct diagnosis in an acute condition of the right abdomen than to have these five or six points always in mind, and to narrow them down by a process of elimination until we are reasonably sure of indicting the one that is left.

First, let us remember that nothing is absolute in disease; people do not get sick according to the rules laid down by text-books; there are a myriad variations. It is, after all, the personal element, the alertness of the observer, that counts for accuracy and success in diagnosis. Let's forget books and causes and theories for a while, and take a case just as the country doctor sees him. We will say he has been curing tobacco and has been seized with a severe pain in his abdomen. We reach him some six hours later. What has he got? How are we to find out? What are we to do? Let's follow our plan.

Is it his *stomach?* What had he eaten? Has he vomitted? Was there any blood in the vomitus? When did his bowels move last? Was there blood in his stool? Did the stool look black or tarry? Has he ever had an attack like this before? Did emptying his stomach relieve his pain? Did emptying his bowels relieve his pain? How old is he? Remember that ulcer of the stomach is far less frequent than ulcer of the duodenum and occurs in older people.

What is his temperature? What is his pulse rate? Is he shocked, or was he shocked when the attack came on? What is the character of his pain? Is it terrific, agonizing, so that two or more hypodermics of morphine are required to ease him? Is there a marked board-like rigidity that never relaxes?

What is it that happens to an ulcer to produce such a picture? It is perforation. How could one tell a perforation of the stomach or duodenum from a perforation of the gall bladder? You can't tell—unless you had determined beforehand from previous knowledge of the case that the patient already had gall-stones or an ulcer. It would make no difference anyway, for a hole in one hollow organ is as bad as a hole in another. Nature is about as apt to seal one as the other, and she does it far oftener than we have any right to ask it of her.

Before dismissing the stomach: Examine his lungs. Are both clear, front and back, and from top to bottom? Has he a diaphragmatic pleurisy? Always think of this and pneumonia.

The gall-bladder.—Practically speaking,

*Read at the fifty-fourth annual meeting of the Medical Society of Virginia in Roanoke, October 16-19, 1923.

there are two acute conditions of the gall-bladder which we must always bear in mind in such a case as we have outlined—inflammation of the gall-bladder, and stones in the gall-bladder. They may exist separately or together.

In cases of severe repeated attacks of pain without fever, if we can fix it on the gall-bladder, it is fair to reason that the condition is a mechanical one and is due to stone. If accompanied by fever, we know that inflammation is present, whether accompanied by stones or not. Gall-bladder pain and ulcer pain, gall-bladder tenderness and ulcer tenderness are so much alike that it is the patient's history that will be the determining factor in making a differential diagnosis.

The right kidney.—Always palpate the kidney with one hand in front and one over the kidney region in the back, and see if it is tender. A big, distended gall-bladder, or a high, post-cecal appendicular abscess may fool us to death, but not every time, so let's try every time.

Let's make a microscopic examination of the urine, always catheterized in the female, and in the absence of pus and blood we feel reasonably safe in excluding pyelitis and stone.

The appendix.—Any of the symptoms of appendicitis may be lacking in a given case. Every surgeon has operated for acute appendicitis when the trouble was in the gall-bladder or when an ulcer of the duodenum had perforated. We will doubtless make other similar mistakes. But, when we have fixed the responsibility on the appendix and turn over our symptoms; nausea, vomiting, pain, localized tenderness, fever, rapid pulse, rigidity—of all the symptoms enumerated, be over-careful in the absence of nausea or vomiting. If he has not been nauseated nor vomited, go over him a second or third time.

The right ovary and tube.—Always make a careful vaginal examination where there is any question at all. We can usually demonstrate an inflamed ovary or swollen tender adherent tube, or we can exclude it definitely from further consideration.

I have not stressed the laboratory side of our diagnostic work; but there are two invaluable aids which can be done so quickly that they should be in reach of all. They are a differential white blood count and a microscopic study of the urine. A high poly count would exclude typhoid fever from our consideration; if very high, with a board-like rigidity, we might clinch a diagnosis of perforation and hasten surgical intervention. If a microscopic analysis will eliminate the kidney, it is well worth any time and trouble that may have been taken to make it; for, if we mistake an appendix for a gall-bladder, we remove the appendix and no harm is done, but we do not operate for pyelitis. It is most important to exclude or confirm it.

I have not taken up the question of X-ray. We would not resort to it, of course, in acute cases, if we had it at hand. But it is invaluable in chronic or interval cases. In skilled hands about eighty per cent of ulcer cases can be demonstrated by it. A negative X-ray for gall-stones means nothing, for shadows are gotten in a very small proportion of cases when stones of even considerable size exist.

In all cases great care should be used in getting an accurate history, and nothing so conduces to accuracy as writing the history down. One gets the dates, facts, and the logical sequence of events then clearly fixed in the mind and, if memory fails us later, it is all there on paper. The history of indigestion and flatulence is important; the effect of taking of food on the attacks.

Many people with gall-stones have eliminated one article of diet after another, until they scarcely have enough to sustain them. Ulcer people, and especially duodenal ulcer, will usually tell us that food relieves their pain, or that the pain is worse just before meals when the stomach is empty. Some have formed the milk and cracker lunch habit, to stop these hunger pains. Ulcer people almost all take soda, because it gives them relief. So much is this true that soda-taking should be regarded as a symptom. Gall-bladder people are not soda eaters, though some use it to help get the gas from their stomachs, getting a measure of relief in this way.

Gall-bladder pain goes through to the shoulder; but ulcer pain may do this also. It is the relation of pain to eating that gives us the differential clue. The tenderness and pain is about in the same locality for both. And remember the gall-bladder and pylorus are not at fixed points up under the margin of the ribs, but are often on a level with the umbilicus.

Jaundice is found in so small a proportion of cases that we do not lay stress upon it. If

present, it points very definitely to the gall tract, and means mechanical, inflammatory, or malignant obstruction.

When we have decided that the case in hand is not one of simple indigestion, what is the best and safest thing to do, pending operation? Avoid the use of purgatives. Purgatives promote peristalsis, and peristalsis promotes perforation and tends to spread inflammation. Empty both ends of the gastro-intestinal canal and splint the middle segment. The stomach tube above; the enema tip below; splint the middle with small doses of morphine at regular intervals. If one-eighth grain is given every four hours, it will give better results than a larger dose given only after suffering has become acute, and in the end less of the drug will have been given.

To continue with our patient: let us say we have made out our case and opened the abdomen and found our diagnosis is correct. We have gall-stones and cholecystitis. What shall we do?

Of course, we assume that a man who would open the abdomen is prepared to do anything that may be called for by conditions as they present themselves. There is in my judgment too great a tendency now-a-days to "follow the leader;" to go in pre-determined to follow this or that particular plan. It is a question that requires sane judgment in the individual case. I have seen gall-bladders removed, with which I could see nothing wrong. I have left in gall-bladders that I know ought to have come out. I have done so deliberately, because I believed that in the case in question removal was a far more hazardous operation than simple drainage. No one should be ashamed to do a second operation for the removal of a gall-bladder that he has previously drained.

To briefly summarize: a gall-bladder with thin walls, not diseased but containing stones, may be opened, the stones removed, and the opening sutured and the gall-bladder dropped back without drainage, as emphasized in a paper by Dr. Willis.

The gall-bladder, if containing pus but with walls but little affected, may be drained with the assurance of a very fair proportion of permanently good results: and, by this, I mean cured patients.

The gall-bladder, if greatly thickened and atrophied, or tremendously distended, or if gangrenous, should be removed. If, however, the technical difficulties are very great and a prolonged operation would prove dangerous, if there is profuse capillary hemorrhage when adhesions are separated, one should drain and quit; and be no more ashamed of it than of the first step in a two-stage prostatectomy.

The best operator is not always the best surgeon. A good surgeon should have the courage to do as much or as little as is necessay, to get his patient well.

1000 *West Grace Street.*

DISCUSSIONS OF PAPERS BY DRS. McGUIRE AND PEPLE.

Dr. A. Murat Willis, Richmond: The relative proportion of the cases of calculous and non-calculous cholecystitis is of much importance. If Dr. McGuire has removed one thousand gall-bladders in twenty years and twenty-six per cent of these were instances of non-calculous cholecystitis, it would be interesting to learn what percentage of non-calculous cases has occurred in the past five years, since he has come to direct more attention to the condition. From one of the great clinics of this country, there was recently reported a series of 500 cases of cholecystectomy, ten per cent of this number being instances of non-calculous cholecystitis. Of the gall-bladders removed from the patients suffering from "non-calculous cholecystitis," thirty-three per cent were found to be normal on histological examination, and the subsequent history of the patients showed that no relief was obtained by the operation. From another great American clinic, a report came a few years ago, stating that forty per cent of all cholecystectomies were performed on patients suffering from non-calculous cholecystitis; and histological examination revealed that *all of these gall-bladders were diseased.* Such diverse reports as these suggest that there is something radically wrong somewhere.

Another point is whether it is safe to close the abdomen without drainage after cholecystectomy. If we *must*, on the basis of obscure digestive disturbances for which we can find no other clear cause remove a gall-bladder, is it necessary to introduce a drain? We may be reasonably sure of furnishing the patient with an adequate cause for his subsequent symptoms, for our drain will inevitably introduce infection and lead to formation of adhesions. Naturally, there are instances where one should hesitate to omit drainage after cholecystectomy, but, as I pointed out years ago, in many cases, its omission results in a more rapid and less uncomfortable convalescence with less likelihood of post-operative complications. My attitude receives support from the experience of operators at the Mayo Clinic; two thousand cholecystectomies without drainage have been performed there recently. Dr. McGuire sleeps better when he employs drainage; he will find that his patients will sleep better if he omits it in suitable cases; they will have a smoother convalescence; and the dangers of post-operative adhesions and hernia are lessened.

Dr. McGuire, in closing: The paper I read discussed many unsettled questions and contained the expression of many positive opinions; therefore, I expected more criticisms than I received.

Dr. Willis speaks as if there were two distinct forms of gall-bladder disease, cholecystitis with stone and cholecystitis without stone. I think there is but one form. If infection of the gall-bladder occurs, then cholecystitis results and a stone may or

may not form. A gall stone is not the cause of cholecystitis, but a result of the disease. It is purely an incident in the pathologic process. In operating for gall bladder disease, I am not influenced by the presence or absence of gall-stones; I am interested in the condition of the gall-bladder itself. As I stated in my paper the worst gall-bladders I have ever removed or drained contained no stones.

I do not advocate removing innocent gall-bladers, but some gall-bladders look innocent when they are really diseased and cause symptoms. When a patient has symptoms which clearly point to the gall-bladder and when the preliminary examination and the exploration at operation fail to show any other cause for the symptoms, then I would remove an apparently innocent gall-bladder on suspicion. This suspicion will be confirmed nine times out of ten by the laboratory examination of the specimen.

Finally, with reference to drainage: I do not drain cases because it makes me sleep better, but it makes me sleep better to drain cases, because I am sure it is safer for the patient.

Despite the greatest care in ligating the duct and controlling bleeding, I continue to have biliary drainage in a certain proportion of the cases I operate on. Although I have studied these cases carefully, I am unable to explain the cause or to predict under what conditions it is most likely to occur. I therefore drain all cases in order to protect the few who need it. I use a strip of soft rubber tissue, which does no harm if it does no good.

DR. PEPLE. in closing: I have nothing to add except that I think we should not fall into a routine. We should consider each case on its own merits. The gall-bladder is there for a very definite purpose, and it should not be removed without definite indications for so doing.

The easier, quicker convalescence of the cholecystectomy over the cholecystostomy cases probably tempts us to do the latter too often.

As for drainage, I have not yet gotten to the point of feeling safe in closing a cholecystectomy wthout drainage.

GONORRHEAL ARTHRITIS.*

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A comparatively short time ago, Rosenau called attention to focal infection as a potent factor in disease. Since then, we have come to realize that teeth and tonsils are responsible for a great many ills, but in the general onslaught on these members, the genital tract has been to some extent overlooked. Consequently, in many instances the true focus remained undiscovered and untreated. Arthritis as a sequel to gonorrheal infection of the genital tract is a rather common occurrence. Its prevalence and gravity justify a more careful consideration. This communication is intended to present a general resumé of the subject of gonorrheal arthritis, its various manifestations, methods of diagnosis, and treatment.

There is evidence that the gonococcus was considered a possible cause of arthritis long before Lindermann[1] in 1892 demonstrated its presence in diseased joints. However, his demonstration does not seem to have been very convincing since Sternberg[2] writing in 1896 discredits the claim and Strümpell[3] in 1897 dismisses the subject with scant attention. In 1896, Thayer and Blumer[4] found the gonococcus in blood culture, thus indicating a possible route of joint infection. In recent years, many investigaters have demonstrated the gonococcus in joints, establishing its position as the etiological factor in the disease. However, very little interest has been shown in gonorrheal arthritis and very slight progress made in its diagnosis and treatment, as evidenced by the meagre literature on the subject, especially in this country.

Etiology.—Arthritis is the most serious complication of gonorrhea. It destroys tissue and produces ankylosis. It shows a marked tendency to recur and commonly results in endocarditis. Approximately five per cent of all cases of genital gonorrhea are complicated by obvious arthritis. Many more cases presenting less striking symptoms are either neglected or entirely overlooked. It is interesting to note that typical cases of arthritis may result from infection of the eye[5] and even of the finger.

Metastasis to the joints usually occurs in the acute stage of the primary infection, although it may occur in any stage.[6] During an acute urethritis, the patient may altogether escape arthritis, only to have an attack in the chronic or latent stages. Recurrent attacks are prone to be of increasing severity. Frequently, especially in women, there is no concurrent evidence, clinical or otherwise, of uro-genital infection. In such instances the diagnosis rests upon the demonstration of the organism in the joints.

Young adults show the greatest susceptibility to gonorrheal arthritis, although practically no age is exempt. It has been observed in children under ten.[7] Certain observers (Northrup[8], Norris[9]) claim a greater incidence in males, but in dispensary and hospital where both sexes are represented, we have observed practically an equal proportion in females. The colored race in this country is especially susceptible to the disease. No joint is immune

*Read at fifty-fourth annual meeting of Medical Society of Virginia in Roanoke, October 16-19, 1923.

to the infection but the most commonly involved is the knee. The order of incidence in other joints is as follows: ankle, wrist, digits, elbow, shoulder, hip, tempormaxillary, metatarsal, sacroiliac, sternoclavicular, chondrocostal, intervertebral, cricoarytenoid, tibiofibular.[10] The condition is usually monoarticular, but two or more joints may be affected simultaneously or in rapid succession.

Pathology.—Except for the peculiar tendency to production of osteoporosis[11] and greater disposition to ankylosis, the pathology of gonococcal arthritis does not differ materially from that produced by other organisms. The inflammation is not confined to the articular surfaces but spreads along the tendon sheaths and adjacent periosteum, giving to the joint a fusiform appearance. Instead of affecting the articular surfaces, the inflammation may be confined to the soft tissues around the joint; in which event the capsule contains an accumulation of cloudy, serous or sero-fibrinous fluid with few leucocytes and gonococci may or may not be present. Infection of the articular surfaces and synovial membrane results more commonly in a thick, cloudy fluid, showing many leucocytes and usually the gonococcus in pure culture or associated with other pyogenic organisms, especially staphylococcus and streptococcus. Roughening of the articular surfaces with calcareous deposits may result. Adhesions may form between the surfaces, producing ankylosis. A less marked limitation of motion follows fibrous overgrowth when the infection is confined to the soft tissues around the joint.

Symptomatology.—Gonorrheal arthritis presents itself in various forms, and it is difficult to differentiate them sharply. A subacute or chronic case of uro-genital gonorrhea may be attended by lightning-like pains with only slight joint inflammation or no clinical evidence at all. Osler has called these attacks arthralgic. Except for these fleeting pains, the patient is free from symptoms. This form of arthritis is as commonly met with as it is commonly unrecognized. Occasionally, the patient experiences sharp pains along the course of a tendon or over a bursa but presents no evident pathological changes or constitutional disturbance. In the chronic form of arthritis, when exostoses occur on the os calcis, what is known as "painful heel" results.

The type next in severity is the single joint, usually the knee, distended with a serous effusion. The joint is inflamed, painful, and motion is limited. There is a tendency to chronicity in so far as the fluid is apt to remain for a prolonged period of time. In this type there may be a slight elevation of temperature, but generally there are no constitutional symptoms.

The most virulent type of gonorrheal arthritis resembles an acute attack of rheumatic fever. It usually attacks several joints in rapid succession. Its sudden onset with a rise of temperature to 103° F. and prostration is suggestive of a septicemia. The joint is hot, swollen, distended with fluid, extremely tender and has a fusiform appearance. The slightest motion produces excruciating pain. While the joint is at rest, there is only slight discomfort. The effusion is in the joint as well as in the surrounding tissues. Occasionally, the periosteum and the bursae are involved. Ankylosis may follow one of these acute attacks. Usually as soon as one joint subsides, another flares up.

During or closely following the joint attack a cardiac murmur may appear. With the progress of the disease, the murmur becomes more pronounced until it can be heard all over the precordia, indicating the presence of an acute endocarditis. Septicemia may set in with a sudden rise of temperature to 105° F. accompanied by chills, sweating, and extreme prostration. The prognosis is grave, such cases usually terminating fatally. However, neither the onset or the entire attack may be so severe. Although the acute joint may be present, neither symptoms of valvular lesion nor septicemia may follow, yet recurrent attacks always predispose the patient to these dangers.

Diagnosis.—Definite diagnosis rests upon the finding of the gonococcus in the aspirated fluid. This procedure first employed by Lindermann (loc. cit.) has not been generally adopted by the profession. Apparently, there is a manifest hesitancy to puncture the joint for diagnostic purposes, due, perhaps, to a fear of producing a mixed infection. Under ordinary precautions this danger is negligible, and the procedure should be more commonly employed. The technique offers no special difficulties, produces but slight discomfort, and is not apt to result in any complication. After preparing the part with iodine, a sterile No.

20 needle attached to a glass syringe is thrust vertically through the most dependent part of the joint into the space between the articular surfaces. If no fluid is obtained at first, the direction of the needle may be changed or reinserted at another point. Novocain, one per cent, may or may not be used depending upon the patient.

It is evident that the history of a previous infection must be elicited. The uro-genital tract should be investigated with great care for presence of gonococci and gonorrheal lesions. In the presence of a positive history or of definite lesions, suspicion of joint involvement is aroused if the patient has shooting pains in the joints or along the tendons, or stiffness with or without pain, even though there is no inflammatory reaction. The purulent joint gives a leucocyte blood count of 12,000 to 20,000. There is no record of any observation bearing on the occurrence of leucocytosis in the other forms of gonorrheal arthritis. The complement fixation test is a great aid in diagnosis. Kolmer[12] states that the reaction is positive in eighty per cent to 100 per cent of all cases, when using a polyvalent antigen.

X-ray offers but little aid in diagnosis. A. L. Gray (personal communication) states that in acute cases there is nothing characteristic except for the evidence of a diffuse arthritis. If, in a chronic case, there is ankylosis of the patella to the femur, the case is very apt to be of gonorrheal origin, particularly if there are at the same time spurs on the os calcis.

Differential Diagnosis.—It is evident that gonorrheal arthritis closely simulates other common conditions. In absence of definite findings, the differentiation is often difficult. In acute articular rheumatism the fever is higher, sweating and prostration are more pronounced. The joints are apt to be more sensitive and usually several are attacked simultaneously. Puncture of the joint commonly shows the streptococcus. Gout, in this country, is relatively uncommon; it shows evidences elsewhere such as tophi and arteriosclerosis, and usually affects one joint. Arthritis deformans shows peculiar deformities as a result of osteophytic processes. Polyarthritis chronica villosa occurs in women at menopause and in children; the disease is of long duration, pain is severe and independent of motion. What is known as "chronic rheumatism" is characterized by absence of acute manifestations, its slow progress and its occurrence in middle and old age. This condition is probably infrequently of gonorrheal origin. Tubercular joints are common in children. The symptoms and X-ray clear the diagnosis promptly. In Charcot's joint, absence of pain, symptoms of tabes dorsalis and X-ray serve to differentiate. In neuritis the nerve trunk itself is sensitive to pressure, the pain is boring, follows the course of a nerve, and usually the attack can be traced to some etiological factor, such as infectious disease, or organic poisons.

Treatment—In an acute case, the patient should be put to bed, given a light, nourishing diet and plenty of water. The affected joint should be immobilized. Pain may be alleviated by local application of ice and full doses of salicylates. A tonic of iron and arsenic is advantageous later on. When the acute stage subsides, moderate exercise of the joint should be employed. If a coincident urogenital infection exists, it should be vigorously treated and, if necessary, surgery resorted to. Cunningham[13] advises removal of seminal vesicles. Little can be done locally for the arthralgic pains; eradication of the urogenital focus and systemic treatment are the only methods of use. Hot air treatment of the painful bursae and tendons may be tried. In the painful heel the surgical removal of the exostoses is recommended. In the joint with serous effusion without acute symptoms, aspiration of the fluid, tight bandaging and systemic treatment with attention to the genital focus is a logical procedure. Incision and irrigation of the purulent joint has been practiced but this procedure seems needlessly radical. Potassium iodide, salicylates, hot air, thermocautery, blistering are of little avail except for alleviation of symptoms.

Antigonococcic Serum—The first attempt at specific therapy of gonorrheal arthritis seems to have been made in 1907 by J. C. Torrey, working in the Loomis Research Laboratory; Torrey injected intramuscularly 2 cc. of the serum for 3 or 4 days and a complete cure was apparently obtained; later he increased the dosage from 36 to 45 cc., giving 12 to 15 cc. daily for 3 days with good results. In 1919, Debre and Paraf[14] punctured joints in 15 patients with different types of gonorrheal arthritis and injected the serum in place of the

evacuated effusion; in six cases the cure was complete in less than 8 days, while eight cases were cured within 15 days. Later, others reported success with serum injection. Results with the gonococcus serum are not uniform; nevertheless, it is a valuable remedy and should be more commonly employed. This serum has been available for some time in 5 cc. ampules; it should be given in acute cases in doses of 15 cc. intramuscularly on 3 consecutive days. Injection of foreign proteins is of doubtful value in acute cases and of no value at all in chronic cases.

Sensitized vaccine was employed first by Besredka in 1902 and proved to be of some benefit. Howorth[15], Cole and Meakens[16], Rogers and Torrey[17] find vaccine therapy of value and this has proved true in our experience. Vaccine may be given in acute or chronic stages, small doses of 10 million cocci in acute and 50 million in subacute, every five days. It is advantageous to increase the dosage gradually, beginning with 25 million cocci, increasing by 5 million daily or every other day up to 550 million. In diabetes, carcinoma, advanced nephritis, and other debilitating diseases the use of vaccines is contraindimated.

Defour and Debre[18] aspirated joints and, without heating or sterilizing the fluid, injected it subcutaneously and report good results from this procedure. Ballenger and Elder[19] state that in order to obtain satisfactory results the synovial fluid must be infected and purulent. They used 15 to 20 cc. of the fluid every 2 to 7 days.

Ross[20] employed 10 to 20 cc. of electrargol intravenously every second day and reported very striking results. In one case herewith reported we aspirated 20 cc. of fluid from the joint and replaced it with 25 cc. of 5% argyrol, with the result that other affected joints subsided and there were other evidences of systemic action.

Case Reports.

On account of its typical character and especially interesting features, the following case is reported in detail.

Case 1. F. C., colored, female, age 18. Three years ago the patient had an attack of gonorrhea attended by acute symptoms in right knee and metatarsal joints. At intervals, since then, she has had 4 early joint attacks involving hip, intervertebral, temporo-mandibular, wrist, and metacarpal joints. The present attack began four days ago with swelling of right shoulder and left elbow joints. They became distended with fluid, extremely painful, and motion was limited. The metatarsal and lumbar intervertebral joints are painful but not swollen. She has a sore throat. There is a faint systolic murmur at the apex transmitted to axilla; cryptic, hypertrophic tonsils; fever of 102° F. She gives a history of dysmenorrhea and leucorrhea. Her Wassermann, blood culture, urine, cervical, urethral and vaginal smears are negative. On day of admission, leucocytes—13,500; 6 days later the leucocytes increased to 24,800. Six days after admission, 20 cc. of a cloudy, straw-colored fluid was withdrawn by puncture from the right shoulder. Microscopic examination revealed abundant pus cells and intracellular diplococci. The pain in the shoulder was relieved by the puncture. On the following day, 1125 million cocci of polyvalent gonorrheal vaccine was administered intravenously with increased doses every other day. A week later, another 30 cc. of cloudy fluid was withdrawn from the shoulder and 25 cc. of 5% argyrol was injected. In 4 hours the temperature rose from 101° F. to 105.6° F. She had been running a fever between 101° F. and 104.6° F. On the following day the temperature came down to 100.6° F.; on the second day to 98.8° F. and gradually returned to normal. Three days after the argyrol injection, the left elbow was absolutely normal and the pain in the intervertebral and metatarsal joints gone. The shoulder joint remained distended for 14 days, at the end of which time the joint returned to normal; by that time the cardiac murmur was very faint and confined to the apex. In the meantime, the genital infection was treated. She was discharged as cured.

Case 2. M. J., colored female, 36. Two weeks before the right knee began to swell, the joint was red, painful and limited in motion. On admission, the joint is distended with effusion, slightly tender, no inflammation. She gives a history of pain in the lower abdomen, leucorrhea, dysmenorrhea, and shooting pains in other joints. Tonsils atrophic, teeth in good condition. Cervical, vaginal and urethral smear negative. Twenty-five cc. of clear yellowish fluid was withdrawn from joint; no organisms found. The knee was tightly bandaged and she was given increasing doses

of vaccine. In a week she was discharged as improved and referred to the gynecological dispensary for treatment of the genital infection.

Case 3. M. F., colored female, 19. Married 3 years ago; since then had pain in lower abdomen, dysmenorrhea, menorrhagia, leucorrhea and, within the last month, she had pain in knee, elbow and ankle joints with slight swelling. Wassermann 3 plus, no gonococci in smears. A double salpingectomy was performed on her. Previous to the operation she was given vaccine treatment. She made an uneventful recovery and was discharged as cured.

Case 4. J. H., colored male, 22. Four weeks ago the patient had an acute attack of gonorrheal urethritis which subsided in two weeks. Immediately after the cessation of the urethral discharge, the right elbow joint became swollen, painful and motion was limited. The patient was seen two weeks after the elbow was involved. The joint had a fusiform appearance, swollen, flexed at an angle of 35° and extremely painful to slightest motion. Temperature 99.8.° Patient complained of headache and malaise. Physical examination otherwise negative. X-ray showed no bone lesion. A joint puncture was done and a small amount of cloudy fluid withdrawn; a smear demonstrated intracellular diplococci. Ten cc. of 5% argyrol was injected into the joint. In two days, the patient's physical condition was improved, the joint pain subsided and, within one week after injection, the swelling almost entirely subsided, motion returned to normal and pain was entirely gone. He was referred to the genito-urinary department for treatment of the urethral condition.

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Discussion

Dr. H. S. Hedges, Charlottesville: Just one word about eye complications which are by no means uncommon in chronic sub-acute gonorrhea. In all cases very much violent pain is suffered, which is sometimes so severe that it is hardly controlled by morphine. Sensitized and autogenous vaccines have been used and have given some of the most brilliant results.

Dr. M. Pierce Rucker, Richmond: This is a very important subject. No age is immune. Dr. Royston has recently reported one case in the new born which showed no evidence of surface infection. He thinks that it was undoubtedly transmitted through the placenta. The infant had involvement of the knees and elbows and, later, ankylosis of the jaw. In the fluid that was aspirated, gonococci were demonstrated—a very interesting observation.

I have never seen a case in a new born, but have seen several mothers with gonorrheal infection in the puerperium.

THE CONCURRENT OCCURRENCE OF TUBERCULOSIS AND ASTHMA.*

By GERALD A. EZEKIEL, M. D., Richmond, Va.

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We were taught in the medical colleges fifteen years ago that a patient with asthma never had tuberculosis. This belief is still held to be true by some physicians of today, and the effect of this teaching of the physicians of ten or more years ago is still fresh in the minds of the laity. I have asked a good many tuberculosis specialists, whom I have met, their views on this point, and they all tell me that they have seen the two conditions present at the same time, but that this common erroneous idea that they do not occur in conjunction does exist. The object of this paper is to com-

*Read at the fifty-fourth annual meeting of the Medical Society of Virginia in Roanoke, October 16-19, 1923.

bat this fallacy and to try to establish the truth on this point. The need of this was forcibly presented to me by a patient of mine, an asthmatic, absolutely refusing X-ray examination, because a specialist in Philadelphia ten years ago told him that asthmatics never had tuberculosis.

The diagnosis of tuberculosis in conjunction with asthma is at times rather difficult, due to the alteration in breath sounds by the asthmatic breathing. The sibilant and sonorous rales of asthma render obscure and almost, if not entirely, inaudible the fine crepitant rales of an early or slight tubercular infection of the lungs.

In my experience, the diagnosis of the concurrent existence of these two conditions can be made most often by aid of the history, X-ray examination and bacteriological examination. I am giving a few case histories to illustrate the application of these points. In several of these cases the physical findings were either altogether negative, or else typical of bronchial asthma but, on account of a suggestive history, X-ray examination was ordered and gave definite positive results. To speak of the bacteriological examination in tuberculosis may seem trite. We all know a positive finding means tuberculosis without question and that a negative report does not necessarily rule out tuberculosis. I want to emphasize the need of repeated examinations before regarding a sputum as negative. I have received as many as eight negative reports and then on the ninth examination obtained a positive report.

Case No. 1158, November 6, 1919. E. P., white, male, age 8. Present illness began with bronchial trouble three years ago, now has fever, loss of weight, weakness, shortness of breath, dull pain in chest, cough, good deal of expectoration. Physical examination: Diminished expansion of chest, percussion note increased, few coarse rales left base. November 12, 1919, weight 48¼ pounds. Sputum: Negative. Provisional diagnosis was made of asthma and probable pulmonary tuberculosis. November, 1920, patient was placed in hospital for further observation. Weight 47¼ pounds (one year later.) Physical examination: Emphysematous breathing, sibilant rales throughout the chest. X-ray examination November 6, 1920, as follows: "Patient has a slight bronchial type of tuberculosis, involving both lungs. A good deal of this is well calcified but there are uncalcified tubercles seen in both lungs, chiefly the upper and lower right lobes and outward from the hilum in the left lung. There is a slight pleural thickening between the upper and middle lobes of the right lung. Each hilum contains a dilated bronchus." Sputum: Positive. Protein sensitization test: Reacted to egg and cabbage. Final diagnosis: Pulmonary tuberculosis and asthma.

Case No. 1299, October 25, 1922. Mrs. E. D., white, female, age 29. Present illness began with bronchitis ten years ago, now has night sweats, loss of weight, weakness, indigestion, shortness of breath, dull pain in chest, expectorates thick yellow mucus. Normal weight 190 pounds, present weight 161¾ pounds. Physical examination: Squeaking rales throughout the chest. Sputum: Negative. Wassermann: Negative. Provisional diagnosis: Asthma and pulmonary tuberculosis. X-ray examination November 24, 1920 as follows: "Patient has apparently a slight bronchial type of tuberculosis, chiefly in the middle lobe of the right lung. The bronchial branches in this lung and the structure in the right hilum are much thickened. Emphysematous areas are seen outward from right hilum." Final diagnosis: Pulmonary tuberculosis and asthma.

Case No. 1442, May 17, 1921. A. S., white, male, age 40. Present illness began four years ago with pain in chest, now has loss of weight, fever, weakness, indigestion, shortness of breath, cough, hemoptysis, and has had several hemorrhages. Physical examination: Lungs emphysematous and full of sibilant rales and rhonchi. Sputum: Negative. Wassermann: Negative. Provisional diagnosis: Bronchial asthma and tuberculosis. This patient was finally successfully X-rayed in July, 1921 with the following report: "Patient has a general fibrosis of all bronchial branches particularly on the right side. Numerous calcified tubercles are seen in both lungs. There is a group of uncalcified tubercles behind the second right interspace. There is a mass of scar tissue to the right of the heart extending from hilum to the diaphragm. The mediastinal pleura is thickened. Patient has a hypertension type of aortic arch. The top of the aorta reaches well below the sterno-clavicular joint. The heart and aorta are small. Conclusion: Patient has a fibroid phthisis. The marked scar tissue de-

posit to the right of the heart, extending outward from right hilum, is suggestive of a specific infection." Final diagnosis: Pulmonary tuberculosis, fibroid type, and asthma.

Case No. 1918, August 17, 1922. Mrs. V. C., white, female, age 26. Gave history of having had asthma the last twenty-one years. Present illness, asthma for last two months, tires easily, loss of weight, night sweats, cough, expectorates a great deal of greenish yellow sputum. Normal weight 102 pounds, present weight 91 pounds. Physical examination: Few rales in right upper lobe, hypertrophied tonsils. Sputum: Negative. X-ray report September 2, 1922, as follows: "General thickening of all bronchial branches. A few well calcified tubercles are seen in each lung. Patient has had pleurisy on the left side resulting in a pleural adhesion at the left costophrenic angle. There is no evidence of recent unhealed, clinical tuberculosis." Provisional diagnosis: Asthma and pulmonary tuberculosis. This patient's tonsils were removed and she was given sanatorium treatment. Final diagnosis, April 26, 1923: Chronic pulmonary tuberculosis arrested, and asthma. At this time she weighed 124 pounds, a gain of 33 pounds and was doing nicely.

I might at this point explain that the provisional diagnosis is made at the time of the first examination of the patient. An attempt is made to form an opinion of the case, so as to have a working diagnosis. In the first case cited, provisional diagnosis was made and one year later confirmed by X-ray and sputum examination. Up to this time the sputum had been negative. In the second, third, and fourth cases the diagnosis was confirmed by X-ray examination. Positive sputum was never obtained in these three cases but the X-ray findings, with the history and physical findings of these cases and the outcome, bear out the diagnosis as made. I could give some additional similar case histories, but these few are typical of the point I wish to make, that is, X-ray and sputum examinations will enable you to properly interpret and confirm an otherwise obscure or questionable diagnosis of tuberculosis and asthma occurring concurrently.

In making the provisional diagnosis, asthma was placed first. This was usually the disease condition that caused the patient to seek medical advice. In making the final diagnosis, pulmonary tuberculosis was placed first, because this seemed to be the main condition to be treated and certainly the more important. It is possible the asthma is super-imposed upon a tuberculosis due to a protein sensitization to tubercle bacilli. I have not had the opportunity to study this point sufficiently to make any definite statements at this time, but merely mention this as a possibility and a point that I hope to be able to investigate later.

1652 *West Grace Street.*

THE BLOOD CULTURE AS A DIAGNOSTIC AID.*

By AUBREY H. STRAUS, M. A., Richmond, Va.

We have all heard of people who claim to have had typhoid fever more than once. We have also probably met physicians who claim to have treated typhoid fever two, or even three, times in the same person. I have never heard of a case, however, in which there has been laboratory proof of typhoid fever occurring more than once in the same person.

I cannot, of course, undertake to say that such a thing is impossible, but I do regard it as most unusual. The true explanation of these occurrences, in all probability, is the fact that there are quite a variety of bacteria which may occur in cases of enteric fever. Clinically, the infection caused by many of these organisms is identical with true typhoid fever.

Many such organisms are known and there are doubtless others not yet described. In Table I we have summed up all our blood culture work, showing a large variety of findings. Yet there are many organisms described by others which we have never encountered.

The figures in Table I are of considerable interest in showing how great the variety of such infections may be. The rapidly increasing use of the blood culture has made this table possible and will, in future, doubtless disclose a still greater range of infections than those so far found.

While the physicians of Richmond have made use of the blood culture for many years, it is only during the last year that it has begun to come into general use in the rural sections. With the further simplification set forth in this paper we hope to see its use extended.

*From the Laboratories of the State Board of Health and the Richmond Health Bureau.
Read at the fifty-fourth annual meeting of the Medical Society of Virginia in Roanoke, October 16-19, 1923.

TABLE I.

SUMMARY OF BLOOD CULTURES EXAMINED.

Result	Number	Per Cent
Positive	249	22
Negative	881	78
Total	1,130	100

The positive results were as follows:

FIRST GROUP.

Organisms Causing Infection Clinically Resembling Typhoid Fever.

B. Typhosus	217
B. Para-typhosus B.	6
B. Coli	6
Unidentified Bacilli Resembling Para-typhoid	2
B. Fecalis Alkaligenes	1
Bacillus resembling B. Asiaticus	1
Friedlander's Bacillus	1
Unidentified, hemolytic bacillus	1
	235

SECOND GROUP.

Organisms Causing Infection, Not Usually Resembling Typhoid Fever.

Streptococcus	8
Pneumococcus	3
Meningococcus	1
Influenza Bacillus	1
Unidentified Bacillus resembling the Influenza bacillus	1
	14

In the first group of the above table, it may be noted that there are seven organisms, other than B. typhosus, causing eighteen cases which the attending physicians stated could not be distinguished from true typhoid fever. In most of these cases, however, the course of the disease was mild. The variety of these infections is far greater than anticipated. Para-typhoid fever in Virginia appears to be rare, especially para-typhoid A. Because of this fact, we advocate the use of the straight typhoid vaccine rather than the "triple vaccine," which contains also the two para-typhoid bacilli.

The cases in the second group, for the most part, developed symptoms corresponding to the blood culture findings. In one case, however, a death certificate had already been signed for typhoid fever before our report of the "pneumococcus present" was rendered.

In view of these results we are convinced more than ever that the blood culture is a most valuable diagnostic test. Without a blood culture, cases will be diagnosed as typhoid fever that are not, and some will *not* be diagnosed as typhoid fever that are. For a physician to diagnose "para-typhoid fever" without cultural confirmation, or specific agglutination, is inaccurate.

While there is no specific treatment for any of these infections a physician should, nevertheless, be interested in knowing what he is treating. Unquestionably, some of the unsuccessful protection reported from typhoid vaccine has been in cases where the infection was of some other nature.

From a public health standpoint, the type of infection is very important. The precautions necessary in a case of typhoid fever are hardly necessary in a B. coli infection. Likewise, it would probably be useless in this case to search for the source of the infection.

The Widal reaction or agglutination test, in suspected typhoid fever, should always be used in conjunction with the blood culture. By this I mean a real agglutination test made from whole blood, and not the obsolete and unreliable test made from a drop of dried blood.

In a general way the agglutination test is of most value after the disease has been in progress for ten days or more, and the blood culture of the greatest value during the first week or ten days. No definite limits can be set, however, and we find great variation. Therefore, the only dependable way is to get a specimen of whole blood and have both tests made.

Formerly we have supplied special outfits, containing bile medium, for blood cultures and other outfits for agglutination, but we now find this to be unnecessary. In Table II we have compared regular blood cultures with cultures made from the clotted blood, and obtained results as satisfactory by the one method as by the other, so far as typhoid fever is concerned.

TABLE II.

COMPARING BLOOD CULTURES AND CULTURES MADE FROM CLOTTED BLOOD.

Blood Culture Direct into Bile	Cultures from Clots		
	Positive	Negative	Total
Positive	19	3	22
Negative	3	65	68
Total	22	68	90

As shown above each cultural method disclosed three positive cultures not found by the other method. Nineteen bloods were positive by both types of culture and sixty-five were negative by both. It seems probable that the role of chance, due to the small amount of blood used, might account for this; that is, it appears that the clot-culture is about as reliable as the regular blood culture, but where

both are used, and consequently more blood examined, the chances of positive results are increased.

In the above discussion we refer only to organisms in the first group in Table I. Organisms of the second group in Table I do not grow in bile culture medium, yet we find this the most satisfactory medium for organisms of the first group. As it is not practicable to handle several different containers, where specimens must be mailed, and, as ninety-four per cent of all positive findings fall into group one, we have used only bile medium in our statewide work.

Where organisms such as the streptococcus, pneumococcus, and the influenza bacillus are suspected, bile culture medium is not satisfactory. In these cases suitable medium must be obtained from the laboratory, and the blood inoculated directly into this medium.

Since cultures made from the clotted blood have shown results as satisfactory as inoculating the blood directly into bile medium, a single tube of whole blood may be used for the two specimens. This simplifies matters greatly for the practitioner, as all that is necessary is to draw 3 to 5 c.c. of blood aseptically and put it into a test tube, just as is done for a Wassermann test. From the serum in this tube an agglutination test is made in the laboratory and from the clotted blood a culture. Negative results on both of these tests will rarely occur in true typhoid fever.

The laboratory methods used in all of this work have been described elsewhere* and will not be repeated here.

In conclusion I wish to point out:

First. Not all enteric fevers with certain clinical manifestations are typhoid fever.

Second. The blood culture is the only method of determining the nature of these other infections.

Third. For a reliable diagnosis in typhoid fever both a blood culture and an agglutination test must be made. A tube of whole blood, aseptically collected, will serve satisfactorily for both tests.

Fourth. In cases of suspected endocarditis, septicaemia, etc., special culture medium must be used in order to obtain satisfactory results.

*Straus, Am. Jour. of Pub. Health, Aug. 1921.
Straus, Jour. of Lab. and Clin. Med.
Straus and Bird, Am. Jour. of Pub. Health.

SYMPTOMATOLOGY AND DIAGNOSIS OF EXOPHTHALMIC GOITRE.*

By Wm. B. PORTER, M. D., Roanoke, Va.

A study of the symptoms of a disease involves an analysis of those disturbances produced by the structural, metabolic and psychoneurotic changes incident to the perverted physiology in the affected being.

The diagnosis of a disease must involve a careful weighing of the evidence afforded by a study of the symptoms, the abnormal physical phenomena, the collected laboratory data, and lastly, a broad and common-sense amalgamation of all these into a composite picture of the clinical status of that human being.

During the last few years much has been accomplished in the study of the endocrine system, yet in no class of patients is one so liable to be tripped by symptoms or does one encounter such bizarre and uncertain physical phenomena as in the suspected case of exophthalmic goitre.

The perverted physiology and bio-chemical changes occurring in hyperthyroidism involve the entire somatic system; consequently, in no disease is it so important that the diagnosis carry with it a broad and complete understanding of all the immediate and collateral evidence of disturbed function, for it is only upon this complete inventory that a rational and sane therapy can be based.

In this discussion we are not interested in those patients who have a "lump" in the neck, and who have none of the primary or secondary manifestations of exophthalmic goitre and no elevation of basal metabolism. We are interested in those patients who, with or without thyroid enlargement, present symptoms and signs best grouped under the single term of "sympatho mimetic," the term of Barger and Dale to denote "manifestations that are tantamount to electrical stimulation of the thoracico-lumbar division of the involuntary nervous system, or to stimulation of this same system by adrenalin." Such signs include the cardinal symptoms of tachycardia, exophthalmus, goitre and tumor, and the minor symptoms of exophthalmic goitre, such as diarrhoea, sweating and palpitation.

The work of Lieb, Kessel, Hyman, and Lande has shown that this symptom-complex

*Read in the symposium on "Disease of the Thyroid" at the Southwestern Virginia Medical Society in Abingdon, September 6 and 7, 1923.

can and does exist in patients who have no elevation of basal metabolic rate or who never have had such a disturbance of catabolic function. These observers have coined the term "autonomic imbalance" to denote that group who have all or most of the primary and secondary manifestations of exophthalmic goitre, but who do not or have not had an elevated basal metabolism, a group undoubtedly representing a much larger percentage than has been generally appreciated.

Recently, a woman thirty-six years old consulted me, complaining of nervousness, palpitation, tachycardia and dyspnoea with exertion. She stated that eighteen months previously she was operated on in another city, at which time a partial thyroidectomy was done. Her symptoms now were the same as they had been prior to her operation. At this time she was getting radiation over her thyroid which had been begun seven months previously. She felt that her symptoms were exaggerated rather than improved.

Examination disclosed most of the orthodox signs of exophthalmic goitre, i. e., slight exophthalmus, tachycardia, tremor and pronounced sweating of the hands and axillae. The basal metabolic rate was 36, —40, —38. This patient was given thyroid extracts and a tonsillectomy was done and in six weeks' time she reported feeling practically normal.

This case well illustrates one of the main points I wish to make in the consideration of the diagnosis of exophthalmic goitre. The diagnosis is complete and accurate in so far as it carries with it the information necessary for a sane and logical therapy. The patient was undoubtedly one suffering from "autonomic imbalance," who incidentally had a goitre. This disturbance of her involuntary nervous system had been activated by a focal infection in her tonsils and accentuated by the psychic insult of frequent abortions. The hyperthyroidism was no doubt the result of the thyroidectomy and prolonged radiation. The basis upon which treatment was begun and resulted in cure was not the disturbance of her involuntary nervous system but the knowledge derived from a study of her basal metabolism which showed a markedly depressed rate.

In a study of patients who present the manifestations of a Graves' syndrome, I believe it to be absolutely incumbent upon us to determine whether there is or has been an elevation of the basal metabolic rate before any positive therapeutic procedures are instituted. The work of Benedict, Means, Aub, Roth, Carpenter, Boothby, and a host of other observers has repeatedly shown that increased basal metabolic rate is the most reliable single sign in exophthalmic goitre.

In the routine study of patients, one encounters a large group whose symptoms are sufficiently suggestive to place them in the category of hyperthyroid suspects. These patients include those suffering from the neurasthenic states, disturbances of the autonomic nervous system, and functional derangement of the neuro-circulatory apparatus. If there should exist a coincidental goitre, the picture may be most confusing.

Means and Burgess have recently studied a group of border-line cases with particular reference to differential diagnosis. They found that the majority of the type with incomplete evidence of abnormal thyroid function had a normal metabolism. If a basal rate is secured, an increased basal metabolic rate is strong presumptive evidence of hyperthyroidism. They conclude that the metabolism test is distinctly useful in differential diagnosis.

I do not believe that these patients can be differentiated by any one laboratory test. It is usually possible to place them in their proper category by a clinical analysis of the individual, using the laboratory finding as confirmatory evidence, with due regard for its limitations and pitfalls.

The study of the endocrine system is in its infancy. The advances made are too frequently based upon speculation and hypotheses, hence conclusions are uncertain. The diagnosis of thyroid disease has not been simplified by any of the newer methods of study; rather it has become more complex, but this is not regrettable if we are able to more accurately define the type of patients demanding selective therapy.

The determination of this fact may be accomplished by a careful analysis of the existing symptoms and abnormal physical phenomena, yet there are few of us who would be willing to treat a case of typhoid fever without a clinical thermometer. Then why subject a patient to a major operative procedure or radiation until it has been determined with

some degree of accuracy whether such drastic measures are indicated? They may be, but there is a fair chance that they are not.

Various laboratory procedures have been introduced as an aid in determining hyperactivity in thyroid disease, the Goetsch test, Kettman's reaction, the Glucose Mobilization Rate, and many others, but undoubtedly the use of the closed calorimeter is the simplest and most consistent method at our command. The value of this method is in direct proportion to the appreciation of the necessity of careful and repeated tests. It is a laboratory procedure and is, therefore, not devoid of possible error, but when one properly balances it with a careful history, an analytical analysis of the symptoms, and a painstaking survey of the physical phenomena, one then has that data necessary for a logical diagnosis.

Lewis-Gale Hospital.

THE MEDICAL TREATMENT OF GOITRE.*

By W. W. CHAFFIN, M. D., Pulaski, Va.

The medical treatment of goitre was assigned to me and I have no choice in the matter, and must tell you not only what I believe about it, but also what is believed about it by medical men of note.

I believe all the authorities agree that the drug which has promised more for the relief of the symptoms of goitre, if not the cure, is iodine in some form.

Crile has shown that iodine is taken up by the thyroid gland when given by the mouth, by inhalation, or by external application, and it makes very little difference, from a scientific point of view, what form of iodine is used, as the thyroid will take it up from the most stable compounds, even mercuric iodide.

Wyeth even went so far as to report favorable results from the inhalation of iodine which were secured by the suspension in the patient's room of a wide-mouthed bottle containing a ten per cent solution of tincture of iodine.

The early Greeks treated goitre by the internal administration of the ash obtained by burning sea sponges, not knowing that the substance was rich in iodine.

In 1907, Marine emphasized the fact that iodine is necessary for the proper function of the thyroid, and also that in active hyperplasia of the thyroid, the iodine store is reduced. Consequently, the administration of iodine should theoretically control this active condition. However, this is not the case practically, at least not to any extent. How many of us have seen the fruitless painting of the neck with iodine for this condition? About all we have seen is a tremendously sore condition of the neck added to the other discomforts of the patient. So much then for the iodine treatment.

The glandular treatment has been much exploited and as heartily condemned. Theoretically it promised much, but practically, it proved to be a "will of the wisp."

Personally, I have treated a good many cases with the different forms of medication and rest in bed. I have tried the iodine thyroidectine, sodium cacodylate, sedatives, etc., and I honestly believe that, aside from the rest the patient gets, the results from the treatments were nil; and the only good my treatment did was to rest the patient and get her in better condition for a surgical operation. So you see where I stand on the treatment of these cases.

*Read in the symposium on "Disease of the Thyroid" at the Southwestern Virginia Medical Society in Abingdon, September 6 and 7, 1923.

SURGICAL TREATMENT OF DISEASES OF THE THYROID.*

By T. J. HUGHES, M. D., Roanoke, Va.

Doubt and inexactness add much to the problems of the thyroid. This fact is emphasized by the preceding papers in this symposium. The ground has been thoroughly covered as regards the pathology, etiology, diagnosis and therapeutic treatment of this important gland, which has been termed the "balance wheel of nutrition."

The etiology has been doubtfully accepted, therapeutic treatment is speculative in its results, and in most cases is varied and uncertain and, until we know more exactly the amount of thyroid tissue to remove to correct thyrotoxicosis, and yet avoid the ultimate results of excision of too much of the gland, we should avoid extreme radical thyroid surgery, bearing in mind the tendency in every field of modern surgery for the pendulum of radicalism to swing too far.

The differences of opinions of leading clinicians and surgeons upon thyroid problems,

*Read in the symposium on "Disease of the Thyroid" at the Southwestern Virginia Medical Society in Abingdon, September 6 and 7, 1923.

which should have long ago been definitely settled and generally accepted, should make both the therapeutist and the surgeon accept, with solemn duty and responsibility, the management of diseased conditions of the thyroid gland.

Too much and too long treatment may stimulate the growth, increase thyrotoxicosis and bring disaster to the heart and nervous system; while removing too much or too little gland tissue, without proper preparation and analysis of the case in hand, may make a worse wreck of the patient or subject it to a recurrence of the devestating condition.

There is, probably, no subject more generally discussed, more indefinitely settled, and less generally accepted than are the problems of thyroid surgery. There are, however, a few facts which have been established by clinical observation, pathological and histological study and practical experience which should be emphasized, and should serve to strengthen our endeavor to avoid the pitfalls which beset the pathway of both physician and surgeon.

From the surgical standpoint, I would call attention to the fact that tumors of the thyroid are more often malignant than is generally supposed, that malignancy occurs earlier in life than is the case with perhaps any other organ of the body. Of 290 patients with malignant tumors of the thyroid gland, examined at Mayo Clinic from 1901 to 1921, more than fifty per cent developed goitre before they were thirty years of age, and about twenty-five per cent of this series had not noticed any thyroid enlargement previous to one year before the diagnosis of malignancy was made; hence the importance of avoiding prolonged stimulating treatment, and referring these cases early for surgical treatment before the gland or tumor undergoes malignant degeneration. Louis B. Wilson, from a careful study of the pathology of tumors of the thyroid, believes that they all have their origin in proliferating "fetal adenomas." It is most important that all nodular tumors of the thyroid be examined and, if markedly proliferating adenomatous tissue is found, the tumor should be considered potentially malignant and the thyroidectomy followed by X-ray treatment, and the patient kept under observation for a long period of time.

Eminent surgeons differ in their opinions as to the diagnostic value of the reading of the metabolic rate, some relying to a very great extent on this index as an aid in diagnosis and relative safety in operative procedure, while others almost wholly disregard it. It does seem, however, that, if nothing more, the metabolic rate is of great importance in differentiating between psycho-neurosis and true thyrotoxicosis, especially when the thyroid is not appreciably enlarged. The writer believes, perhaps contrary to the general opinion, that exophthalmic goitre and all toxic adenomata are purely surgical conditions, and that the health of the patient would be better conserved if all tumors of the thyroid, in adults, were removed as early as possible after recognition. Both the psycho-neurotic cases, with little or no thyroid enlargement, and the non-toxic cases with thyroid enlargement, are dangerous pitfalls and may lead to disastrous delay.

The diagnosis should be definitely made; the degree of damage from thyrotoxicosis determined and remedied as far as possible by appropriate preparatory treatment; then bear in mind that any plan of surgical procedure we may decide upon is dangerous. No operation should be attempted, not even a preliminary ligation, until the probability of an approaching crisis has been reckoned with.

The question of "When and How" to operate is another problem afflicted with divergent opinions. The relative safety in primary ligation, multiple stage operation, and operation in one stage, is by no means settled. Mayo and Crile ligate frequently, with confidence in its safety and benefit, while Finney, McGuire, and others apparently consider it an unnecessary ordeal. I am not convinced that, after the preliminary rest and preparatory treatment, primary ligation has any advantage in safety over multiple stage excision, provided care is taken not to do more than our patient can stand; and whether the gland is removed in one or multiple stages, in extreme toxic cases, the incision should be left open, packed and closed on the following or second day after operation. If death is going to result from hyperthyroidism, it will usually occur within a few hours after operation; therefore, the surgeon and all assistants should remain on the job and employ every means to sustain the patient and to combat reaction of the temporary hyperthyroidism. Ice bags to the head, heart and groins, saline and glucose solutions by proctoclysis, hypodermoclysis, and intra-

venously, if necessary, should be employed.

The most popular incision is the ordinary Kocher collar, made in such a way that a string of beads will cover the scar, the flap dissected up, the muscles retracted without division, if the size of the tumor will admit of its removal without difficulty. If, however, dexterity is enhanced, the muscles may be divided and sutured without appreciable loss of function or deformity. From four-fifths to seven-eighths of the gland is excised, leaving a floor of thyroid tissue and the posterior surface of the capsule overlying the trachea, and protecting the parathyroids and recurrent laryngeal nerve from damage during the operation.

Anesthesia

In my opinion, one of the most important questions the surgeon is called upon to decide in thyroid surgery is the proper anesthetic to use. Gas-oxygen, local analgesia and general narcosis, all have their advocates. The writer is convinced that local, or a combination of local and gas-oxygen anesthesia, should always be used in exophthalmic goitre and other forms of toxic adenomata.

1st. The condition leading to surgical shock, such as position of the patient's head, producing dyspnoea, undue pressure from instruments, and the afferent stimulation of the sensory nerves, are greatly lessened by the use of local anesthesia. The patient is a welcome assistant in avoiding injury to the recurrent laryngeal nerve by being able to cough or talk at the suggestion of the operator.

2nd. Post operative nausea and vomiting rarely occur and consequently the tendency to hemorrhage is lessened.

3rd. Liquid nourishment may be given immediately after operation, and the employment of hypodermoclysis, proctoclysis and intravenous methods of supplying needed fluids are often found unnecessary.

4th. The danger of post-operative pneumonia is eliminated and, in our experience, post-operative reactions of hyperthyroidism are fewer and less severe, under local anesthesia.

Satisfactory anesthesia may be obtained either by infiltration or nerve-blocking methods. A half per cent solution of novocain, which has been boiled, is used. If the infiltration method, or combination of both, is used, the dissection of the flap is facilitated by thickening of the subcutaneous tissues of the neck by the inhibition of the solution injected.

With the proper preparation of the solution, healing should be by first intention. The patient is allowed to sit up on the second day, and leave the hospital at the end of the week, or ten days.

The post-operative treatment consists in sustaining the heart and quieting the nervous system, as suggested above, in avoiding or combating surgical shock and the temporary hyperthyroidism which often follow thyroidectomy. To this end, in addition to the measures already mentioned, we give large doses of digitalis, which is begun a day or so before operation, and continued until the heart's action is quieted to within normal limits after the operation. The patient is kept quiet and the nervousness controlled for the first twenty-four hours by morphia hypodermically, bromides and chloral, and such other quieting and sustaining remedies as may be indicated.

The following is a brief report of a case operated on yesterday. Mrs. P., age 43, entered the Shenandoah Hospital, September 1, 1923, complaining with pelvic and bladder discomfort, generally run-down condition, very nervous, loss of flesh, rapid pulse, foul breath and extreme weakness. A goiter about the size of a lemon, which to her mind was not giving her trouble, was observed. Further examination revealed metabolic-rate plus 38, blood pressure S. 140, D. 105, pulse rate 130, urine negative, except there was a large quantity of bladder epithelial cells. Except for the rapid pulse and slight irregularity, the heart showed no abnormal condition.

Family History: Married, has seven children, all living and healthy, except three have goiters. The patient has had her goiter for the past twenty-three years, has enjoyed good health up to the past few months, when the symptoms given above began and have gradually grown worse; she has marked tremor but no bruit and no exophthalmus. Blood examination negative.

Diagnosis: Toxic adenoma of the thyroid. Operation performed September 5, 1923, under local anesthesia, employing the combined block and infiltration methods; pulse at begaining of operation was 110, at the close 88. As the patient's condition was good, we closed the incision.

A letter from this patient about three months after this article was written states that she is now enjoying perfect health.

Ameriacn National Bank Building.

THE THYROID PEDIATRICS.*

By ROGER H. DUBOSE, M. D., Roanoke, Va.

It is my sole object in this paper to discuss briefly the most common types of thyroid disease in infancy and childhood.

In the last five years there has been a great advancement in the field of "Ductless Glands." The possibilities of further advancement in this field are perhaps greater than in any other branch in medicine. We still know very little about the function of these glands. We do know that the thyroid secretion has something to do with the development of the young, both mentally and physically.

The most common forms of thyroid disease are cretinism and myxedema. These are merely different expressions of a hypo-functioning thyroid gland. The clinical signs of the cretin are characteristic, yet the diagnosis is not always simple in the very young, for we are apt to be confused with a mongolian idiot and achondroplasia. Some authorities believe that cretinism is often due to psychical disturbances during pregnancy. We now accept the fact that cretinism is due to the absence of the internal secretion of the thyroid gland. The same condition holds true where the gland is removed by surgical means. Congenital absence of the gland is often times noted in post-mortem findings. It is spoken of as congenital myxedema.

The clinical signs of the cretin are not so evident in the very young, yet an early diagnosis is most essential, if we expect to obtain our very best results by the administration of thyroid extract.

Physically, cretins are short in stature, usually under weight as compared to the normal infant. The hands and feet are small. The thumbs are especially short. The skin is very dry, rough, wrinkled and often times copper colored. The neck is short and thick. The nose is broad and flat. The tongue is thick and protrudes. The fontanelles are late in closing, likewise dentition is delayed. The cretins are habitually constipated. The majority of them have umbilical hernia. The temperature is sub-normal. The hair is coarse, dry and straight. Talbot, in measuring these infants found the length of the arm from the acromion process to the tip of the second finger to be shorter than in the normal infant, likewise the length of the leg from the pubic bone to the sole of the foot to be much shorter than in the normal. The head of the cretin appears to be much larger as compared to the normal child but, if measured, it will be found to be approximately the same.

Mentally, these infants have a stupid facial expression. They are as stupid as they appear to be. They do not sit, walk or talk as early as the normal child.

Fisher, as well as Talbot, found the basic metabolism in cretins to be much lower than in the normal. The same is true in some cases of mongolian idiocy. It is exceedingly difficult to obtain the basic metabolism in the very young. That being the case, it occurs to me that the most practical method to puruse, when we suspect a mental retardation, is to put these infants on thyroid extract. The earlier the administration of thyroid extract is begun, the greater the improvement will be, both mentally and physically. The longer the treatment is delayed, the greater the chances are for the cretinoid condition to become fixed.

No hard fast rule can be laid down as to the quantity of thyroid extract to be given to the unfortunate ones. Some will tolerate larger doses than others. Talbot says the maximum dose of thyroid is that which would bring the basic metabolism up to the basic metabolism of a normal child, of the same age. I usually begin with a small dose, and gradually increase it until my patient shows signs of some nervous manifestations. They often times vill tolerate 1 to 3 grains a day. When the pulse becomes quickened, it is advisable to reduce the dose to one-half, and gradually increase it again.

Achondroplasia is a rare disease in children because of the fact that very few infants having the disease survive infancy. They are usually prematurely born, or develop hydrocephalus soon after birth and die. When these infants do develop into childhood, their mental powers are normal and the physical condition is usually good. Teeth usually appear at a normal age. The most notable feature is the shortness of their limbs, while their bodies are

*Rend in the symposium on "Disease of the Thyroid" at the Southwestern Virginia Medical Society in Abingdon, September 6 and 7, 1923.

of normal length. The parts affected are those portions where cartilage is replaced by bone.

I do not know just what the basic metabolism would be in these infants. The rarity of the disease probably prevents much research work in these cases. So far as I konw, there is no treatment that will produce growth.

The mongolians differ from the cretins in having a comparatively thin neck, normal temperature, soft smooth skin, and slanting eyes. They are not as short and chubby as the cretins. The similarity of a mongolian and cretin in the old is not so evident as in the young.

As stated above, in some cases of mongolian idiocy the basic metabolism is low. In these cases, thyroid extract is of therapeutic value. Evidently there is some close connection between these diseases. This is also true in some cases of a mental defective.

I have a boy, now four years of age, who came under my observation one year ago. At the age of two and one-half years he could say three or four words. He was seven months of age before he sat up. His first teeth appeared at nine months of age. He stood alone at fifteen months of age. He was three pounds under weight. He apeared to be nervous, restless and irritable. Family history negative. No history of birth trauma whatever. The tonsils and adenoids were removed at two years of age. A diagnosis of mental defective was made, and he was put on mixed glands.

In less than six months there was a decided change in the child's mental condition, and today you would not suspect him to be mentally defective, yet his physical powers are slightly below normal. His disposition has changed to that of the cheerful, playful child. He appreciates his toys and is much more obedient.

Hyperthyroidism is said to be due to the hyper-secretion of the thyroid gland. The disease is rarely seen in children. The ratio is about one to fifty as compared to adult cases. When it does occur, they have a protrusion of the eyes (exophthalmus), muscular tremor, palpitation of the heart (tachycardia) and usually bilateral enlargement of the glands. They often have hemorrhage from the nose because of the increased blood tension. The symptoms are practically the same as those seen in adult cases. It is well to remember that in the young you are dealing with the growing organism, and in the adult that fact may be disregarded. The basic metabolism is increased in these cases and acts as a good guide for a definite diagnosis.

X-ray therapy in the hands of an experienced operator, and surgery are the most important methods of treatment I know. Various drugs have been advocated, such as belladonna combined with iodide of sodium, strophanthus, digitalis, and spartein sulphate have also been used with very good results.

In conclusion I want to emphasize:

It is most important for us to differentiate between mongolian idicy, achondroplasia and cretinism in the very young. I would suggest that we place every suspected mentally defective case on mixed glands. In this ray we are most likely to derive some benefit. We cannot do any harm if we keep these patients under close observation and do not push the drug too rapidly.

When a definite diagnosis of cretinism is made, the administration of thyroid extract should be continued indefinitely. The same is true in other mentally defective cases where improvement is seen.

Anchor Building.

ROENTGEN RAY TREATMENT OF HYPERTHYROIDISM.*

By JOSEPH T. McKINNEY, M. D., Roanoke, Va.

In the preceding papers of this symposium, the diseases of the thyroid gland have been so fully covered that we shall deal only with the X-ray treatment of hyperthyroidism. The colloidal, cystic, simple goiters, non-toxic adenomata, and those with normal or reduced function causing deformity and pressure symptoms, should never be treated with the X-ray, but treated surgically. Malignant goiters should first be operated upon (if not inoperable) and later followed by an intensive course of X-ray therapy.

The two types of goiter in which X-ray therapy offers good results are the exophthalmic goiter, and toxic adenomata with hyperthyroidism, the later condition having been first and completely described as a definite clinical entity by Plummer. The X-ray then is not a treatment for goiter, but for hyperthyroidism, manifested by constitutional disturbances due to toxemia caused by an excessive secretion of thyroxin, which markedly

*Read in the symposium on "Disease of the Thyroid" at the Southwestern Virginia Medical Society in Abingdon, September 6 and 7, 1923.

stimulates the oxidative process throughout the body.

Increased basal metabolism and estimation of the basal metabolism rate, gives us the most accurate determining factor of the increased secretion of the gland, enabling us to follow the course and results of treatment. No case should ever be subjected to X-ray therapy without careful basal metabolism studies before, during, and after treatment. This one point cannot be too strongly emphasized.

Brilliant as have been the results achieved by surgery in the treatment of toxic adenomata with hyperthyroidism and exophthalmic goiter, the fact still remains that the results even in the most skilled hands are not all to be desired. Development of surgical technique and surgical management of these cases in such master hands as the Mayos and Crile has been one of the outstanding achievements of surgery during the past decade. However, modern surgery has accomplished about all that can be hoped for from surgical measures. For further advances in the handling of these cases we must confidently look to radiation in some form or other. That much remains to be learned in this comparatively new field, all roentgenologists admit, but that brilliant results can be obtained in a number of these cases has been proven beyond doubt in the hands of numerous roentgenologists all over the country.

Surgery in the final analysis aims to remove a proper portion of a hyper-excited gland, but in this we are not then affecting a cure of the hypersecretion. The amount of gland to leave must be based purely upon the judgment of the operator. The X-ray on the other hand not only helps to destroy the gland, but to inhibit the function of the cells composing the glandular structure. According to Holmes and Means "These cells atrophy and disappear and are replaced by connective tissue, which later contracts and interferes with the blood supply to such an extent as to further inhibit glandular function."

Before X-ray treatment is begun, a careful physicial examination by a competent internist should be made, all foci of infection looked for and corrected, if found, basal metabolism tests made, and the tpye of goiter determined. It is absolutely essential that the roentgenologist have the closest co-operation of the internist in the handling of these cases. The great importance of rest, diet, proper daily regime, and co-operation of the patient must not be overlooked.

Treatments are usually administered at three week intervals, from three to five treatments being given. If a patient does not improve after three months from the time of beginning the X-ray treatment, further treatment should not be given in the light of our present knowledge. Usually three areas over the thyroid are treated, using 5MA. 6MM. of aluminum filter, 9 inch spark gap, 8 inch distance and 5 minutes time over each area.

Dr. Richardson in speaking of the Roentgen ray treatment at the Massachusetts General Hospital, under the direction of Dr. Holmes, states "X-ray therapy will accomplish the cure of a percentage of cases, in others bring about improvement. In some cases the results of treatment are as brilliant as any I have seen by any therapeutic agent."

My own experience bears out that of other workers, some cases showing splendid results and, so far as we can determine to date, permanent cures. It is only fair to state, however, that in some few instances patients have not improved. Only recently a case which had not responded satisfactorily after three treatments was advised to seek surgical relief, which she did, and so far as we can judge seems to be doing well. Many other cases have improved, though of course cases which have developed permanent myocardial damage cannot be cured either by surgery, or X-ray therapy, though they may be relieved of their symptoms.

A brief report of the following two cases may be of interest.

Case 1. Mrs. C. P., married, age 46, referred by Dr. George B. Lawson, April 31, 1922. Patient presented a typical history for the past six months of the usual classical symptoms of toxic adenomata, complicated by myocarditis. She had lost fifteen pounds of weight in that time, was exceedingly nervous, and was running a pulse rate of 120 to 140. Her metabolic readings, as reported by Dr. Lawson, were as follows: April 31, 1922, (63-56-53) average 56, July 22, 1922, (36-35-39) average 36, August 9, 1922, 30-30, January 8, 1923, 42, March 21, 1923, 35, May 21, 1923, minus 4, plus 2.

Patient was given four X-ray treatments on the following dates, April 31, 1922, June 28, 1922, September 22, 1922, and January 8.

1923. She showed definite signs of improvement after the second treatment and has steadily improved in every way. About ten days ago patient saw Dr. Lawson, and he reports that she was relieved of her symptoms, and that her progress had been entirely satisfactory.

Case 2. Miss S. H. McC., age 35, seamstress, referred by Dr. J. W. Preston, April 8, 1921. He reports that he has had patient under observation for a little over one year, during which time she has been running a pulse rate of 100 to 114, weight 114, blood pressure 140/80, temperature normal. Patient complains of nervousness, loss of sleep, trembly sensations, and general debility. The thyroid showed all three lobes to be slightly increased in size. Slight tremor of the fingers was noted, knee kicks increased, and disturbed heart action present. Tonsils were reported to be diseased and were removed July 14, 1920, though little change was noted in her general condition following tonsillectomy. Chest was negative at all examinations.

Although we were unable at this time to have basal metabolism tests made, X-ray therapy was advised, patient being given treatments on the following dates, April 8, 1921, May 7, 1921, July 2, 1921, and December 2?, 1921. She began to show marked improvement after the third treatment and continued to improve steadily. Her condition at present is good, she is relieved of all her symptoms, has gained over twenty pounds in weight, and has been able to resume her occupation as a seamstress.

The results in the above two cases have been duplicated in a number of others. Only recently a young woman, who had been under observation for over a year and was given four X-ray treatments, recovered to such an extent that she was able to get married this summer.

CONCLUSIONS:

Let me again emphasize that all cases of colloidal cystic, simple goiters, non-toxic adenomata, and those causing deformity and pressure symptoms, should never be treated with the X-ray, but treated with surgery when the occasion demands intervention.

Many cases of exophthalmic goiter and toxic adenomata with hyperthyroidism can be offered permanent cures, and others greatly improved by X-ray therapy. However, should improvement not be noted in three months, further X-ray therapy should be abandoned and an operation advised.

The closest co-operation between the internist, surgeon, and roentgenologist should be maintained in handling these cases. Repeated and careful basal metabolism tests should be made before, during, and after X-ray treatment.

Anchor Building.

SHOULD VIRGINIA HAVE A DEPARTMENT OF PSYCHIATRY?*

By L. S. FOSTER, M. D., Williamsburg, Va.

To give an affirmative answer to the question, we must show the need of a psychiatrist from the standpoint of public welfare and mental hygiene and whether or not such a department will be a liability or an asset to the State.

We go on from day to day feeling that all is well and conditions satisfactory, because, if a person is insane and a menace to society, he or she is committed to an institution, and we overlook the fact that there are as many if not more persons of the moron type, borderland cases, who compose the large majority of delinquents and defectives dealt with in our Juvenile and Police Courts every day and who are passed on to jail, to the great detriment of the offender. We endeavor to wreak vengeance on certain persons for committing offences and in order to accomplish this we lock them up for a while behind steel bars, at much expense, but we make no effort to find out what are the actual causes of their criminal conduct and how best we can eliminate such causes and prevent future crime. We concern ourselves with the deeds of the criminal and overlook his needs. We assume that all men, except those obviously insane are equally responsible and if they commit crime, should be punished, feeling in a vague way that this will compensate for the evil acts they have committed and for the outrages they have wrought on society. Somehow, we hope this will deter them from future criminal conduct. The newer and growing conception is, that the offender rather than the offence is the thing to be studied and understood and that the treatment be regulated more by the moral and mental make-up of the offender than by the nature of the offence,

Certain causes for human failure and anti-

*Read at the meeting of the Seaboard Medical Association of Virginia and North Carolina in Newport News, Va., December 4-6, 1923.

social conduct are readily discoverable by scientific methods. Studies have been made in courts and penal institutions in this and other countries, which show, as far as crime is concerned, that the most important element in the whole situation is the criminal himself and conditions which are found within him and within the environment which influences him. From sixty-five to seventy-five per cent of the inmates of our penal and correctional institutions show physical and mental conditions which have every thing to do with their criminal conduct. You would no doubt find, if diligent inquiry should be made, that two out of every three persons sentenced to your correctional institutions and almost every other person passing through your police court is a recidivist (a repeated offender). If this be so, then we have failed in that which we set out to accomplish in these cases, the prevention of crime; nor have we protected society from them, if they promptly return to the same criminal conduct they exhibited before their arrest. What would you think of an hospital that, after a fixed period of time, returned to the community two-thirds of its cases in no better condition than they were the day they entered the hospital?

This is a plain matter of common sense and public welfare. It is a matter of criticism of our entire system of dealing with offenders. The solution of this evil is a psychiatrist, who can carefully study each offender, as to his physical, neurological, psychiatric and social status; in other words, to find the underlying cause for his conduct, to know his constitutional make-up, his physical and mental condition, and the many and varied causes from within which have every thing to do with his criminal conduct. The most important thing we can bring to this entire problem, is the organization of diagnostic machinery for the careful study of the causes of delinquent conduct and the wise mapping out in the light of this study, of intelligent and far-reaching medical, social and educational treatment.

We believe this problem can be approached and dealt with in the same scientific spirit, with which we have attacked other human evils, such as tuberculosis, yellow fever, malaria, typhoid and other diseases. To do this most effectually, we must investigate the cause of the juvenile offender. It is of the most profound significance to our country that crime has its roots deeply planted in childhood. We think of the greatest woes of childhood as destitution and disease, but delinquency of a degree requiring the attention of courts and officers of the peace, shadows the lives of more children than do some of the most prevalent and serious diseases and the danger of entering upon criminal careers is a more threatening one than is hunger or bodily neglect. The adult is what the child was; so, if we can control the mental, physical and moral life of a child, we can more efficiently direct its future action as an adult. This is the keynote to the program for attacking crime. Childhood is the golden period for this prevention program. In the Juvenile Court, the public school and at home will we find the criminals of the future. What we do or fail to do for these maladjusted children today, will show itself in their criminal or non-criminal conduct in later life.

The need of a psychiatrist to aid the court in recognizing the presence of feeble-mindedness, insanity and other conditions, and giving to persons so afflicted the type of care and treatment they in all justice have a right to demand, can not be doubted. The service of the psychiatrist in such cases will and should have no relation to the question of guilt or innocence of the offender. These are legal matters and are based on facts of evidence, which indicate whether or not the individual did or did not commit the offence in question. The service of the psychiatrist will be after the legal question of guilt or innocence has already been determined; then it is he can afford the court most important aid in the way of information, that will assist in determining what sort of disposition is in the best interest of public welfare and will do the most good for the offender.

The National Committee for Mental Hygiene, New York City, in 1922, made a survey of delinquency and dependency problems in St. Louis, and a part of their report shows that sixty-nine per cent of 178 prisoners studied at the workhouse, after thorough psychiatric examinations, were found to be classified in terms of deviation from average normal mental health; were handicapped by nervous and mental conditions, which are important factors in their delinquent conduct. Thirty-seven per cent was found among those diagnosed, psychopathic personality. This is

in keeping with findings in courts and penal institutions throughout the country. It is the psychopathic individual who furnishes us with our delinquent problem, the unstable, neurotic, poorly balanced individual with marked character defects and personality handicaps, but apparently with good intelligence, is the most difficult problem we have to meet in handling criminals.

Time will not permit me to go further into this phase of the subject. Suffice it to say, that every intelligent, broad-minded man and woman who has studied the subject will agree that, from the standpoint of public welfare and mental health, the State should have a psychiatrist. As to the question of liability or an asset to the State, permit me to say, that it should be remembered that expense is no excuse; we are already shouldering the burden of our failure to early recognize and prevent conditions that have caused despondency. It is not a question of whether we want to pay, that we are doing already. It is a question of whether we want to pay intelligently in treatment, social adjustment and prevention, or unintelligently in relief, financial aid and custodial care. The cost of such a department for the State will be nominal as compared to the saving in its criminal expenses; but it is the aid to the courts and the duty we owe to the offender to give him the best chance to make a useful citizen. These are matters of vital importance to every citizen of this Commonwealth. As has been said, every life is either an asset or liability to society and industry and it should be the aim of the State to aid the unfortunate defective and delinquent in every way, lest we fall short of our duty.

I doubt very much if any of you have carefully examined the State Auditor's report for the year 1922. That report shows that the total expense of the criminals in the counties and cities amounted to the sum of $742,448.40. The astounding part of these figures is the fact that it cost the State for maintenance of prisoners in county jails, that is for board, clothing, medicine and medical attention, $210,728.92 and for the cities the sum of $167,552.08. Just remember this, that for the misdemeanor cases only, it cost the State $89,171.48. You may ask, what we can do about it? I answer, in the first place, have the misdemeanor cases examined to ascertain the cause of their delinquency; you would be surprised to know how many of them are repeaters, mentally deficient, of the moron type.

We should have a State law empowering the judges to give an indeterminate sentence, which beyond question is the most intelligent method to be employed in the sentencing of prisoners, especially the misdemeanants. The indeterminate sentence is based on the theory that, while an offender should be withdrawn from the community for a season in the interest of public safety, he is to be released when he is thought ready to become a useful citizen. This will be decided by the judge, when in possession of all the facts as to the prisoner's mental and physical condition, presented for his consideration by the psychiatrist; then if he is to be returned to the community, he should be placed under the kindly supervision of a well-trained parole officer. The period of release from the penal institution is one fraught with great danger to society as well as the prisoner himself. It is most important that he be tided over this risky period and assisted in every way to readjust himself to normal living.

The obligation of the State to fit prisoners, so far as possible, for that honest work, the lack of which brought most of them into prison seems clear. They go into the jail without a vocation, trade or calling of any kind and they go out in the same condition. The main object of the prison administration should be to fit a man to lead an honest and useful life after his discharge; otherwise, with the best intentions, finding himself incapable of earning an honest livelihood, he will, when discharged, if not supervised, almost invariably turn back to evil ways, and thus you have the recidivist. The psychiatrist can save the State much expense by locating the cause of the repeater, which is most frequently mental and, by proper treatment and management, relieve the courts of their annoying and incessant reappearance. All the misdemeanor cases and addicts should be placed where they can be made self-sustaining and treated as defectives, instead of being made to languish without employment in our jails, at great expense to the State and often in a more pitiable condition when released than when committed.

The problem of the prisoner is educational and mainly one of industrial training. In order that this industrial training shall be effective, there must not only be vocational schools, but industries into which men may be drafted

and in which they may develop their proficiency for the benefit of the State instead of being a charge and there can be no better or healthier place for them than on a farm. Those who for the past twenty years have obtained practical results in the handling of offenders and have passed the experimental stage, feel that the district farm can be made the greatest factor in the reformation of the misdemeanant.

We have in this State three prison farms, one at Occoquan, operated by the District of Columbia, one for the city of Lynchburg, and the other for Newport News. Richmond has been talking about a city farm for some years, but up to this time has done nothing more. Norfolk a few years ago purchased a large farm but has progressed no further. The Occoquan farm is a wonderful institution and doing splendid work for its prisoners. The Lynchburg City farm for the year 1922, with only 77 city prisoners and 81 State prisoners, was operated at an expense of only $351.30 to the city. It is a very great pleasure for me to state that the city farm of Newport News, with 151 city prisoners and 56 State prisoners for ten months of this year, that is from January 1st to October 31st inclusive, with an expenditure of $12,668.59, in which amount is included $3,000 for improvements, had receipts of $23,-146.68, including a balance of $2,569.18 from last year—a splendid showing. The citizens of this city have every reason to be proud of their fine farm and their industrious and intelligent manager. If we had an indeterminate sentence law, the number of prisoners sent to the farm would be at least four times as many as are now sent, with profits in proportion. If this city farm can feed her prisoners at an expense of seven cents a day, why should the State pay sixty cents for the first twenty-five prisoners, fifty cents for the next twenty-five, and twenty-five cents for all over fifty, to the county and city jails, besides denying them the sunshine, fresh air and healthy surroundings, which God intended that every man and woman should have?

Isolation, created by a distant and impersonal supervision, such as we find in most of our jails, is the greatest barrier to reformation that could be built around the first offender. His errors are often the consequence of bad environment and lack of will power and he can not be corrected by indifference and discipline, but by kindness and encouragement.

These thoughts are not advocated from merely sentimental considerations, but from a sincere belief, that the ends of justice are best served by palliatives, rather than by vindictive methods. I believe in the people, but unfortunately the great mass of our citizens are not informed as to the conditions existing in some of the jails of this State. If they were, they would use every effort and every spark of humanity to alleviate the trouble. It is a blight upon our civilization and a reflection upon our intelligence to stand mute in the face of the crowded condition of some of our city jails and do nothing.

PRESENT DAY ATTITUDE TO APPENDICITIS.*

By CHARLES R. ROBINS, M. D., Richmond, Va.

The history of appendicitis and its treatment occupies an important position in the history of surgery. The discovery of the nature of this trouble, the debate as to whether its treatment should be medical or surgical, and the decision that it was purely a surgical condition, were more or less coincident with the development of modern surgery, and in a way was one of the active causes of the movement which resulted in the modern standardized hospital. Previous to the advent of appendectomy, the abdomen was a forbidden city; gynecology was largely a matter of pessaries and office treatment; and abdominal operations were comparatively rare and the subject of intense interest and doubtful outcome. When operation became the recognized treatment, operations began to be more frequent; technique became a matter of supreme importance and intense study, and the necessity of providing a place where proper technique could be efficiently carried out and operative care and treatment supplied called for more and better hospital accommodation.

Appendicitis soon became a vogue, both with the patient and the surgeon, and the ability of the surgeon was indexed by the number of appendectomies he had performed and the number of recoveries. As a result of this a number of discoveries were made. The most important was that the success of the operation depended on early intervention. Even the worst types of appendicitis, those with gan-

*Read at a meeting of the Richmond Academy of Medicine and Surgery, November 27, 1923.

grene and rupture, were followed by prompt and easy recovery if the operation were undertaken early enough, and it became quite common for long series of cases to be reported without a death. Mortality was reduced to a point of often one to one-half per cent. The profession became alive to the possibilities of prompt surgery, and an abdominal pain became synonymous with a ride to the hospital at any hour of the day or night and an immediate operation. It was discovered, also, that many of the symptoms ascribed to other pathological conditions were really dependent on pathology in the appendix. Cases of indigestion, recurring nausea, pelvic disturbances and various other symptoms too numerous to mention, were found to be relieved by the removal of the appendix, and so chronic appendicitis developed its vogue also.

The safety and confidence inspired as a result of the experience in this line of surgery and the results attained, led to the invasion of other fields, and it was then discovered that there was rather more or less common pathology affecting other portions of the gastro-intestinal tract, particularly the gall-bladder and duodenum, together with various kinks and ptoses. Then we had the general abdominal exploration and the development of various slogans, as for instance, "There is no such thing as indigestion," and "pain means pathology."

It is needless to say that as a result of such a wholesale onslaught, it did not take such a great while to develop a negative side; and cases began to crop up with rather disconcerting frequency which had been operated on for this, that and the other, and which had either not been benefited or had been made worse. Cases of acute appendicitis continued to have attacks of pain until they passed the gravel, and so forth.

It was then that the surgeon began to feel the need of an internist. The feeling that every one could be cured by a surgical operation began to be followed by doubts as to whether in any given case cure would certainly follow; and we are now in the stage of the complete study of the case. The pessimism that arises from failures is a very healthy thing. It should lead us to avoid errors and to approach more nearly the unattainable 100 per cent cures. The necessity for exact diagnosis so insistently demanded at the present time and the analysis of results are among the most gratifying developments of the medicine of today; but notwithstanding this, I have noticed in the last few years what appears to be a more or less general change in the attitude toward appendicitis, and it is to several of these points that I wish to call attention now.

The general impression is that the mortality from appendicitis is very small, usually spoken of as one-half or one per cent or less. Now this is a mistake. It is an ideal which can and should be attained, but is not. If every case of acute appendicitis were operated on at the right time, in the incipiency of the attack, there would be practically no mortality. But in a delayed case, whatever the treatment followed, there is and always will be, a definite more or less large mortality. As easy and as certain as is the early operation, the delayed operation presents complications and difficulties that make them as serious as any that we are called upon to perform, and call for the exercise of the best judgment based on a thorough experience. We are, therefore, wrong if we think of appendicitis as a slight operation easily performed at any stage and followed by a certain recovery. Such results can only be attained by early and prompt intervention. I think I find, however, that the difference between the two types of early and late cases is not as clearly defined as it should be, and there is a rather apparent tendency among practitioners to reserve operation for those cases which, as they say, really need it, expecting the same favorable results when the operation is finally performed. I have observed that the number of delayed cases is apparently increasing.

It is often extremely difficult to determine the seriousness of the case in the incipiency of the attack. This is particularly true of gangrenous appendicitis. These cases not infrequently present comparatively few evidences of the serious nature of the case until the onset of peritonitis; and it happens frequently with me, and with others, that a patient apparently in very good condition and presenting few signs of a serious malady, will walk into the hospital and at operation be found to have an appendix that is gangrenous in part or throughout. Delay in such cases must inevitably result in serious complications and doubtful outcome.

The differential diagnosis between appendi-

citis and other conditions is often difficult. Infection of the kidney, stone in the kidney and ureter, strictures of the ureter and many other conditions not related to the gastro-intestinal tract, will produce symptoms quite closely resembling appendicitis. In the past it often happened that a case would be operated upon, few if any evidences of appendicitis found, and the subsequent history would later reveal the true nature of the trouble. These errors of diagnosis have made the surgeon more cautious, and it is the general practice now to review every case carefully, particularly with reference to these pitfalls in diagnosis. As a consequence, cases brought to the hospital for immediate operation are often held up until the doubtful points can be eliminated.

The routine examination of the blood and urine has proved to be very helpful and, where necessary, the roentgenological examination has been used to clear the urinary tract of suspicion. Even with these aids, confusing points may still remain, and the treatment of the case must become a question of judgment. These aids can be applied without serious loss of time or hazard to the patient, but the inevitable result is that in a fair percentage the operation will be very properly postponed or found to be unnecessary or a different operation or treatment instituted.

This doubtless is sometimes embarrassing to the attending physician who may have rushed the patient to the hospital having impressed the necessity of immediate operation to save life or dire consequences. However, I think that the question of diagnosis must always be left to the surgeon who must of necessity be a diagnostician as well as operator, and the case should be referred for review as well as operation. The properly equipped hospital has means for perfecting a diagnosis that are not possible outside in their entirety, and these, added to the larger experience of the surgeon in his particular field of work, must be recognized as making his final opinion of the case paramount. However, these procedures and this delay has created an uncertainty and indefiniteness in diagnosis on the part of the attending physician and he hesitates to refer the case until his diagnosis is more complete. One of the greatest aids to diagnosis is at this point used, namely observation, which requires delay. This is quite scientific in a way but may also prove to be dangerous. Every case of appendicitis should have the chance of an early operation, and there can be no question but that doubts are more safely cleared up in the hospital than elsewhere.

The reason for this paper lies in the fact that I have observed recently a growing disposition to react against some of the tenets previously held in reference to appendicitis and to unlearn some of the fundamental lessons that we have learned, we thought, rather thoroughly. I have been impressed with the fact that I am called on more frequently than formerly to treat serious and delayed cases; and in talking to physicians I have been impressed with a growing spirit of indifference to the dangers of appendicitis and an attempt to do the impossible, and that is to tell whether the case of appendicitis is one that should be operated upon or not.

The facts are I believe,

(1) That every diseased appendix should be removed. This does not mean that any good will come from removing an appendix that is not diseased; and our diagnosis must be complete and searching enough to fix the responsibility squarely on the appendix.

(2) That every acute case of appendicitis should be operated upon early, before grave complications develop, and the earlier the better.

(3) That the favorable results from operation refer to the early, not to the late cases. Safety is in direct ratio to the promptness with which the operation is undertaken.

(4) That it is not always possible to determine the gravity of a case in its early stages. We can never say that any patient with appendicitis is safe when the appendix is allowed to remain in. Many cases of gangrenous appendicitis have mild symptoms and obscure signs in the commencement of the attack.

(5) That in case of doubt, as at times there must inevitably be such cases, it is safer to operate than not.

(6) That these deductions form the basis on which appendicitis must be treated, if successfully, and that a departure from them will mean an inevitable increase in mortality.

Stuart Circle Hospital.

DISCUSSION.

DR. G. P. LAROQUE emphasized the importance of withholding food and carthartics from patients with any kind of abdominal pain unless accompanied with

diarrhea. In a series of 100 of his cases, there was not a single patient who had not taken a cathartic.

Twenty years ago, Ochsner stated that, whenever possible, operation should be done within the first twenty-four hours. When this was not possible, operation should be delayed. Occasionally, patients with an abscessed appendix are comparatively free of pain. On the other hand, little inflammation is found frequently in cases of much pain. Therefore, we cannot consider the clock.

In another series of 100 cases,. Dr. LaRoque was able to carry patients through with morphine and plenty of water, but no food or cathartics.

Dr. Garnett Nelson does not believe that any one can foretell the condition of the appendix from the outside. If it can be proven that some other condition exists, it might be well to postpone operation; but if not, it is best to operate. He cited a gangrenous case, wherein he thought that rupture was certain. He thinks that Dr. LaRoque is in error.

Dr. J. N. Upshur believes in the promptest operation possible. All of the trouble he has seen in this disease has been due to delayed operation. He cited the case of a boy who had all the symptoms of appendicitis, and a consultant called to see the boy was confident the diagnosis was correct, but, the symptoms having abated somewhat, operation was delayed and calomel given. The next day, the patient had improved, and has never had another attack.

Another case was that of a woman, six months' pregnant, who had had pain for two weeks, her attending physicians making a diagnosis of appendicitis. Dr. Upshur, doubting the diagnosis, ordered a purgative and an enema, whereupon there was an enormous evacuation, and the patient made an uneventful recovery. Ten days later, she had premature labor, but has never had recurrence of the pain. He thinks that in these two cases the symptoms were due to pressure of large fecal accumulations on the cecum.

Dr. St. Geo. T. Grinnan asked Dr. Robins if he is always able to distinguish between acidosis and appendicitis in children. He has seen several cases in which diagnosis was doubtful.

Dr. Robins, closing the discussion, stated that he had made no attempt to cover the whole subject of appendicitis. His reason for writing the paper was that many wrong ideas were apparently beginning to be held on the subject. It had been established by abundant clinical experience that prompt operation in the beginning of the attack is followed by almost universal recovery. This has removed the fear of death but it will be found that, when this principle of immediate operation is abandoned, there will be a mortality rate that is quite different. The tendency to delay is dangerous and favorable statistics cannot be secured in delayed cases. Waiting a day or two to see if the patient had not improved allows the favorable opportunity for operation to be lost. The object of the paper therefore was to impress the gravity of delay.

Correspondence.

Topics of the Times.

Richmond, Va.,
December 6, 1923.

To The Editor:

I enclose a clipping, "Topics of the Times," from the editorial page of *The New York Times* of December 3. *The Times* has been such a consistent friend of the regular medical profession that it seems to me it might be wise to reproduce in the Virginia Medical Monthly this editorial comment. The last paragraph of the editorial comment is particularly striking.

If the public could only understand that there is no such thing as "allopathic" doctors, and that the regular doctor has a perfect right to use any remedy he sees fit, we would go a long way toward establishing scientific medicine on a satisfactory basis. When, however, an overwhelming majority of both houses of our legislature, under pressure of lobbyists representing all the imaginable cults, is willing to override our State Board and put through such measures as a special bill to exempt men like De Collard from the jurisdiction of the State Medical Examining Board, and to establish a "School of Poropathy," the task of trying to uphold a standard of scientific medicine is most discouraging.

Is it not time that each doctor should act upon what he or she professes to believe—that the profession of medicine is the noblest possible calling—and resent the contemptuous treatment that is heaped upon the medical profession by many politicians and business men? Elections will be coming on before long. Let each doctor interview the prospective candidate for office and find his attitude about regular medicine and public health measures. It is a strange inconsistency and a straddling of both sides of the issue when a legislator votes for a sentimental appeal for an appropriation for the crippled children's hospital on the one hand, and on the other hand supports a measure to establish some of the cults.

If the doctors themselves would take more interest in such measures, the politicians would not be so contemptuous of the work of the regular medical profession after the election is over.

Sooner or later public sentiment will be aroused by such miserable occurrences as happened in Connecticut and elsewhere, when incompetent and untrained eclectic doctors have been the cause of suffering and death. If the public press would only take the attitude of *The New York Times*, what an enormous help it would be to the people of this State!

J. Shelton Horsley, M. D.

This excellent newspaper states:

HERE IS A CHANCE FOR REFORM

Connecticut's highly commendable campaign against quack doctors, and its reverberations in other States, almost warrant the hope that success might attend an immediate and earnest attempt to change the medical practice laws all through the country. And no laws need changing more. Thanks to the abysmal ignorance in medical matters which characterizes a majority in our legislative bodies, statute books show how well the quacks have been able to win confidence in the two delusions on the acceptance of which their legal right to do business must rest. The first of these is that nothing is "medical practice" except the administration of drugs, and the second is that there are and must be "schools" of medicine, each equally efficient and each entitled to bestow upon its representatives the title of doctor.

Not all who believe those two propositions are insane, and not all who uphold one or the other of them is a conscious swindler. But both are grotesquely false, and the legislators who have treated them as true are responsible for the scandals just revealed in Connecticut. They are to blame for the absurd fact that in most of the States there are several boards, each empowered to examine candidates and grant licenses.

This means that several quackish cults can send "graduates" of their so-called colleges and diploma mills before men of like mind who will turn them loose on the public to minister to the sufferers from all kinds of diseases, and in almost every instance to use in dealing with conditions widely different the single expedient—usually some form of suggestion or massage—with which alone they have been equipped.

ONLY ONE BOARD IS NEEDED

In no State should there be more than one medical examining board, and that one alone should issue licenses to practice medicine. Its members would not belong to any "school." They would be men of real medical education themselves, able to distinguish between a real medical college and a diploma mill—between a real doctor and a quack. They would know that a real doctor is one who has acquired a decent knowledge of all the many means by which disease, by himself or others, can be prevented and cured if curable. They will be ready to use suggestion or the manipulation of bones or viscera in cases demanding it—as ready as they are to administer drugs when drugs are needed or to trust wholly to diet and outdoor life in the not infrequent instances when nothing more is required or can be done with any expectation of benefit.

Not one of the men licensed by such a board would claim universal efficacy for any form of treatment. Whoever does that is instantly revealed as a quack, either ignorant or dishonest, and he is not any the less a quack because he can produce "testimonials" from grateful patients, including the familiar legislator whose close relative was saved from fast-approaching death by an "irregular" after he, or more often she, had been given up by anywhere from one to a dozen "regular" doctors.

The number of people, otherwise intelligent, who thus can be deceived and with the best of intentions can deceive others as gullible as themselves is disgracefully and humiliatingly large.

—*N. Y. Times.*

Why Put Higher Tax Levy on Railroads?

Warrenton, Va.,
December 17, 1923.

TO THE EDITOR:

I am reliably informed that our Congress is trying to put a higher tax levy on the railroads. This in my opinion is a grave mistake of judgment. It is plainly unwise to further tax a utility already bearing a bit too much tax. Mr. Mellon tells us that a lowered taxation on every thing will not only meet all the requirements of the Government but leave a surplus of millions. And it is my impression that Mr.McAdoo expresses the same opinion.

The railroads are now crowded with carriers, giving us reasonable rates and quick and safe service. Why make them pay more tax when the revenue now exceeds the running expense of the Government? It would be far better to lower their taxes and through leniency induce them to put new lines in undeveloped territory, and thereby encourage increased thrift and prosperity. The increased prosperity would tend to lower, not raise, our taxes.

All physicians should be interested in this matter. They should feel it their duty to write our representatives in Congress and try to prevail upon them to vote against all bills offered to place more taxes on the railroads. The people at large should do the same.

STEPHEN HARNSBERGER, M. D.

Proceedings of Societies

Virginia State Board of Medical Examiners.

At the meeting of the State Board of Examiners held in Richmond, December 11-14, 1923, the following doctors were granted licenses to practice medicine in Virginia:

Dr. W. J. C. Agnew. Washington, D. C.
Dr. E. G. Bauersfeld, Frederick Junction, Md.
Dr. F. J. Clements, Fork Union, Va.
Dr. A. A. Creecy, Norfolk, Va.
Dr. Ernest Flehme, Philadelphia, Pa.
Dr. Geza Frank, Brooklyn, N. Y.
Dr. Emily Gardner, Richmond, Va.
Dr. J. M. Gaines, Alexandria, Va.
Dr. C. E. Hawks, Brook Hill, Va.
Dr. P. L. Hill, Gaffney. S. C.
Dr. S. P. Hileman, Richmond, Va.

Dr. C. E. Houston, Virgilina, Va.
Dr. T. D. Jones, Charlottesville, Va.
Dr. J. W. Kirk, Philadelphia, Pa.
Dr. C. A. Luck, Danville, Va.
Dr. W. B. Meares, Jr., Richmond, Va.
Dr. J. J. Olinsky, Norfolk, Va.
Dr. R. J. Neff, Charlottesville, Va.
Dr. C. W. Scott, Charlottesville, Va.
Dr. R. G. Waterhouse, Jr., Richmond, Va.

Richmond Academy of Medicine and Surgery.

At a meeting held on November 27th, the President, Dr. J. Allison Hodges, in the chair, Dr. Mark W. Peyser, Secretary, a new constitution and by-laws was adopted to go into effect at the first meeting in December.

The name of the organization is changed to the Richmond Academy of Medicine, the offices being a presidency, two vice-presidencies and a secretary-treasurership. A Board of Trustees, composed of the five most recent past-presidents, names the secretary-treasurer and the Committee on Discussions, which is the only permanent committee, and considers all the business, bringing to the attention of the Academy only those matters it deems of sufficient importance. This will permit the Academy to devote its time to consideration of scientific matters, doing away with audiences for outside matters.

Dr. Carrington Williams read a paper on and reported a case of, *Diverticula of the Large Bowel Complicated with Carcinoma.*

Dr. Chas. R. Robins read a paper entitled *Present Day Attitude Toward Appendicitis*, which was discussed by Drs. G. P. LaRoque, Garnett Nelson, J. N. Upshur, St. Geo. T. Grinnan and Robins (see paper and discussions on page 714.)

Dr. W. H. Higgins read a paper entitled *Clinical Significance of Hunger Pains*, which was discussed by Drs. J. Shelton Horsley and Higgins.

At the meeting held on December 11th, election of officers was held and Dr. Fred M. Hodges was elected president, Drs. Arthur S. Brinkley and William H. Higgins vice-presidents. The secretary-treasurer is to be chosen by the board of directors. In accordance with the plan to divorce business from the scientific meetings, standing committees were dissolved and all business will hereafter be handled by the board of trustees. This is composed of Dr. Virginius Harrison, Dr. James K. Hall, Dr. Garnett Nelson, Dr. Thos. D. Jones, and Dr. J. Allison Hodges. Upon installation of Dr. Fred Hodges as president at the January meeting, he automatically succeeds Dr. Virginius Harrison as a member of the board.

The year just completed has been one of the most successful in the history of the Academy, due largely to the hard work of the retiring president, Dr. J. A. Hodges, and the interest displayed by members.

MARK W. PEYSER, *Secretary.*

The Southside Virginia Medical Asociation

Held its eightieth session in Petersburg, December 11, with a splendid attendance. Many excellent papers were read and freely discussed, perhaps the most interesting being that of Dr. Guy R. Harrison, of Richmond, whose subject was "The Borderline of Medicine and Dentistry." The active interest shown by the members of the Southside in the problems of the allied profession of dentistry marks a new and very important step forward in the progress of the medical and dental professions of Southside Virginia.

The following officers were elected for 1924: President, Dr. George H. Reese, Petersburg; vice-presidents, Dr. W. E. Anderson, Farmville, Dr. R. H. Manson, McKenney, Dr. Cora Z. Corpening, Suffolk, and Dr. M. H. Tredway, Emporia; secretary-treasurer, Dr. R. L. Raiford (re-elected), Sedley. Members of the Executive Commitee are Drs. E. L. Kendig, Victoria, J. E. Rawls, Suffolk, and C. S. Dodd, Petersburg; members of the Nominating Committee are Drs. J. B. Jones, Petersburg, W. C. Harmon, Dolphin, and D. C. Mayes, Church Road. Drs. D. D. Talley, Frank S. Johns, and Guy R. Harrison, Richmond, were elected to honorary membership in the Association.

The Association adjourned to meet in Suffolk, in March, 1924.

R. L. RAIFORD, *Secretary.*

The Southampton County (Va.) Medical Society

Held its annual meeting in Courtland, on the afternoon of December 14. The following officers were elected for the coming year: President, Dr. S. J. Railey, Handsom; vice-presidents, Dr. J. C. Rawls, Franklin, and Dr. J. N. Applewhite, Capron; secretary-treasurer, Dr. R. L. Raiford (re-elected), Sedley. The next meeting is to be held in April.

The Society adopted resolutions unanimously endorsing a Health Unit for Southampton County, such as is being operated in other counties of the State.

The Warwick County (Va.) Medical Society,

At is annual meeting on December 11, elected Dr. C. B. Courtney, Newport News, president, and Dr. A. D. Ownbey, also of Newport News, secretary-treasurer. Resolutions were passed endorsing the Lye Legislation Bill of the Medical Society of Virginia. Other County Societies are urged to do likewise and to send such resolutions or letters to Hon. E. W. Milstead, of Newport News, who will be the patron of this bill in the State Legislature.

The Dinwiddie County (Va.) Medical Society,

At a recent meeting, elected the following officers for the ensuing year: President, Dr. C. S. Dodd, Petersburg; vice-president, Dr. D. C. Mayes, Church Road; secretary-treasurer, Dr. William C. Powell (re-elected), Petersburg. Dr. F. J. Wright, Petersburg, was elected delegate and Dr. J. M. Harwood, also of Petersburg, alternate, to the House of Delegates for the Staunton meeting of the Medical Society of Virginia.

WILLIAM C. POWELL, *Secretary.*

The Truth About Medicine

In addition to the articles enumerated in our letter of October 27th, the following have been accepted:

Abbott Laboratories
  Butesin
E. Bilhuber, Inc.,
  Afenil
    Ampules Afenil
Cutter Laboratories
  Diphtheria Antitoxin Globulin
  Glycerinated Vaccine Virus
  Gonococcus Vaccine
Hoffmann-LaRoche Chemical Works
  Iodostarin
  Chocolate Tablets Iodostarin-Roche,
  Chocolate Tablets Iodostarin-Roche 0.25 Gm.
Parke, Davis and Co.
  Carbon Tetrachlorid (Human Use)—P. D. & Co.

NEW AND NONOFFICIAL REMEDIES.

Butesin.—n-butyl-para-aminobenzoate. Butesin is the normal butyl ester of 4-aminobenzoic acid. The actions and uses of butesin are similar to those of benzocaine (anesthesin), which is the ethyl ester of 4-aminobenzoic acid (see New and Nonofficial Remedies, 1923, p. 41, Anesthetics, Local, Difficultly, Soluble). Butesin is used as a dusting powder, either pure or diluted. It may be used in the form of troches, ointment, suppositories or dissolved in a fatty oil. Butesin is a white, crystalline powder, odorless, tasteless, almost insoluble in water, but soluble in alcohol, chloroform, ether and in fatty oils. The Abbott Laboratories, Chicago. (Jour. A. M. A., Nov. 3, 1923, p. 1523).

Diphtheria Antitoxin Globulin. This product (see New and Nonofficial Remedies, 1923, p. 283), is also marketed in syringes containing 20,000 units. Cutter Laboratory, Berkeley, Calif.

Glycerinated Vaccine Virus. This product (see New and Nonofficial Remedies, 1923, p. 293), is also marketed in packages containing one capillary tube. Cutter Laboratory, Berkeley, Calif.

Gonococcic Vaccine. A gonococcic vaccine (see New and Nonofficial Remedies, 1923, p. 304), marketed in vials of 5 c.c. and 20 c.c., each cubic centimeter containing 500 million cocci. Cutter Laboratory, Berkeley, Calif. (Jour. A. M. A., Nov. 17, 1923, p. 1693).

Afenil.—Calcium chloride urea. A molecular compound of calcium chloride and urea. Afenil has the actions of calcium chloride. It is claimed that when afenil solutions are administered intramuscularly or intravenously, the drug is better tolerated and less irritating than calcium chloride. It is claimed that the intravenous administration of afenil is indicated in hay fever, asthma and other diseases of the respiratory tract in anaphylactic conditions, skin rashes urticarias and as a means of preventing severe arsphenamine reactions. Afenil is marketed in ampules containing 10 c.c. of a 10 per cent. solution of afenil. E. Bilhuber, Inc., New York.

Silver nitrate solution in capsules. P. D. and Co. An aqueous solution of silver nitrate contained in capsules composed of beeswax with an inner lining of a hard paraffin. The solution is intended for the prophylaxis of ophthalmia neonatorum in the newborn. The solution is marketed in two forms: capsules containing 6 minims of a 1 per cent. solution, capsules containing 6 minims of a 2 per cent. solution. Parke, Davis and Co., Detroit. (Jour. A. M. A., Nov. 24, 1923, p. 1789).

PROPAGANDA FOR REFORM.

The Menace of "Moonshine" Whisky. The untoward results of overindulgence in whisky have usually been ascribed to its alcoholic content, although now and then ill-defined "by-products" of fermentation present in the distillate have been charged with a toxicity out of all proportion to the quantities ordinarily present. The indefinite "fusel oil" and furfurol were often designated as the pernicious ingredients. In properly made and suitably aged whiskies, such constituents could at most play only a minor part in the intoxication produced. While alcoholism is less prevalent today than it was a few years ago, its attendant and after effects on its victims are more serious. The impression is broadcast that this is due to the "moonshine" liquor which is being distributed. The danger from the presence of methyl alcohol in "moonshine" whisky is well-known. Its presence is explained by the use of denatured alcohol (which may contain methyl alcohol) in the preparation of "moonshine" whisky. However, the investigation of the federal authorities indicates that ordinarily methyl alcohol is not the pernicious constituent of illicit whisky, but instead the product has been found often to contain a high proportion of acetaldehyd. The "ranker" the liquor, the higher the aldehyd content. (Jour. A. M. A., Nov. 10, 1923, p. 1611).

Pregl's Solution. It has been stated that Pregl's (isotonic) iodin solution is probably prepared by

treating a solution of sodium carbonate with finely powdered iodin. When the iodin has dissolved, sodium chlorid is added and the solution diluted to a definite volume. The product is stated to contain sodium ions, free iodin, iodid ions, hypoiodite and iodate ions—this in addition to the carbonate and chlorid. A proprietary brand of this solution is sold in Germany as "Presoiod." All favorable reports of the therapeutic use of Pregl's solution have had their genesis from apparently biased sources. (Jour. A. M. A., Nov. 10, 1923, p. 1628).

Iridinol.—The Council on Pharmacy and Chemistry reports that about fifteen years ago "Iridium (Medicinal)" was put on the market by the Platinum Co. of America, and the same company manufactured "Iridinol" which was marketed by the P. H. Potter Chemical Co. (now P. H. Potter and Sons, Inc.), New York. Both products were, at that time, claimed to contain iridium and were marketed for a high price with grossly misleading claims for the efficacy of iridium as a therapeutic agent. Iridium (Medicinal) seems to have been abandoned, but Iridinol, advertised by P. H. Potter and Sons, Inc., as an "ethical preparation" continues to be sold. In the earliest advertising Iridinol was claimed to be a "nontoxic preparation of iridium." At that time the A. M. A. Chemical Laboratory was unable to detect the presence of iridium, and it was concluded that no very large amounts of iridium could have been present. Regardless of the presence or absence of iridium, there is not the slightest evidence for the therapeutic value of this metal in the conditions for which it is recommended by the exploiters of Iridinol. In the present advertising for Iridinol no definite claim is made for the presence of iridium. Instead, the agents merely imply its presence. Iridinol is recommended by the exploiters in anemia, rheumatism, specific blood diseases, diseases of the nose and throat, of stomach organs, liver and kidneys, of the nervous system, diseases of children and as a systemic alterative. In view of the long-continued activities of P. H. Potter and Sons, Inc., for the use of Iridinol, the Council authorized publication of a report for the information of physicians who may be importuned to use it. (Jour. A. M. A., Nov. 24, 1923, p. 1807).

Whooping Cough Vaccine. In a series of articles on biologic therapy prepared under the auspices of the Council on Pharmacy and Chemistry, W. C. Davison (The Journal, Jan. 22, 1921, p. 242), concluded a review of the use of pertussis bacillus vaccine thus: "In summing up the prolific and somewhat contradictory literature on this subject, it may be concluded that injections of Bordet-Gengou bacillus vaccines may have a slight though unreliable prophylactic effect, and that therapeutic inoculations are of practically no value. Further experiments are necessary to raise this procedure from the limbo of nonspecific therapy." The Council on Pharmacy and Chemistry has accepted pertussis bacillus vaccine for New and Nonofficial Remedies, but states in regard to the usefulness of the proluct: "The evidence indicating that it is of value for either prevention or treatment is very questionable, and the reports are conflicting." (Jour. A. M. A., Nov. 24, 1923, p. 1809).

Don't forget to look over the advertising pages before you put down the journal. Patronize our advertisers whenever possible.

Public Health Students to Visit Richmond Bureau of Health.

Dr. Allen W. Freeman, a former Richmonder and head of the School of Public Health Administration at Johns Hopkins University, Baltimore, has announced that a number of the students of the school of hygiene and public health will be sent to Richmond this winter to study the operations of the local bureau of health, records of this department being considered especially good.

To Improve Quality of Carbonated Beverages.

The American Bottlers of Carbonated Beverages have established a research fellowship at Iowa State College, Ames, Iowa, to train scientific workers who may have access to a well equipped laboratory, the object being to improve the quality of carbonated beverages, commonly known as soda water. This is receiving the hearty approval and commendation of experts on food production, including U. S. Government officials engaged in advisory and regulatory work in connection with Pure Food Laws.

Annual Report of the U. S. Public Health Service,

For the fiscal year ending June 30, 1923, covering the one hundred and twenty-fifth year of the existence of the Public Health Service, indicates that general health conditions throughout the United States have continued as satisfactory as in recent years. Also, an increasing interest in Public Health improvement has been noted. The need for new marine hospitals and the difficulty of securing medical officers for the regular corps of the Service are stressed. Twenty-five hospitals are now operated by the Service, including the National Leprosarium at Carville, La.

A novel feature of this report deals with the use of the radio for dissemination of popular health information and the stimulation of greater interest in general health matters. The U. S. Service was the first national health agency to make use of the radio for this purpose, having inaugurated this service July 13, 1921. Its actual cost has been insignificant.

Virginia Medical Monthly

FOUNDED BY LANDON B. EDWARDS, M. D., APRIL, 1874.
OWNED BY THE MEDICAL SOCIETY OF VIRGINIA.
PUBLISHED BY THE PUBLISHING COMMITTEE.

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All correspondence regarding editorial matters, articles, advertisements, subscription rates, etc., should be addressed to the Journal.

All advertisements are received subject to the approval of the Council on Pharmacy and Chemistry of the American Medical Association.

Subscription Price: $2.00 per annum in advance.
Single Copies 20c.

Vol. 50 JANUARY, 1924 No. 10

Editorial

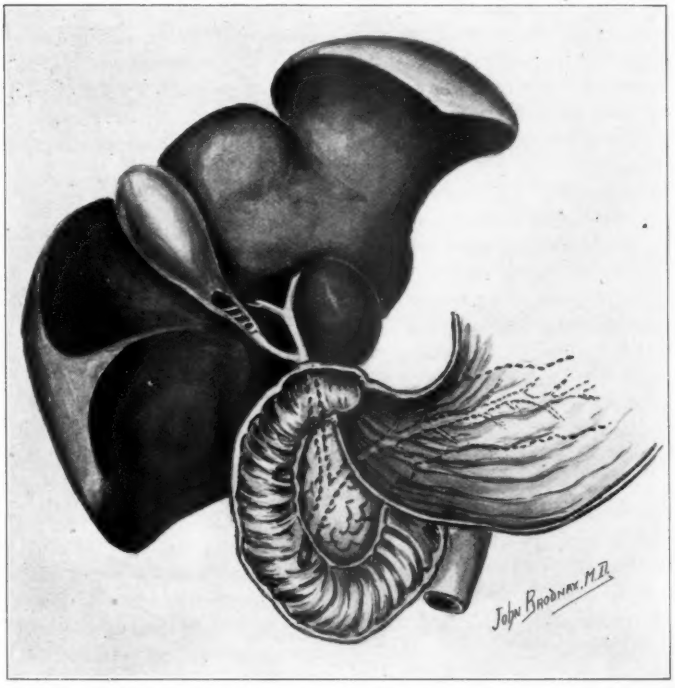
Diseases of Gall Bladder and Bile Ducts.

The occurrence of symptoms originating in dysfunction disease of the gall-bladder and bile ducts is very common. Much of this symptomatology has been covered, in its initial forms, by the terms "biliousness" and "torpid liver," and the like. For such conditions our forefathers in medicine prescribed massive doses of calomel and, in more recent times, "broken doses of calomel" have been widely prescribed. These disturbances of digestive processes, resulting from a dysfunction of the stomach, duodenal, biliary or pancreatic action which culminate in the state called biliousness or torpid liver, may or may not be related to the disease of the gall-bladder and biliary ducts. No doubt, liver cells receiving blood ladened with food products from the portal vein and with blood from the hepatic artery, to say nothing of the lymphatic fluids, are continuously secreting bile, at a more or less normal rate, during the period of so-called torpidity. The flow of bile is probably only obstructed when ejection is to occur from the gall-bladder and common ducts into the duodenum as the acid chyme passes over the mucosa at the site of the ampulla of Vater. The more or less persistent introduction of food products into a tract which is dysfunctioning results in this "bilious" state.

Patients, who are fat and forty, with the history of years of periodic headaches, with recurrent "stomach attacks" characterized by pain in epigastrium, gas eructations after taking food, "heart-burn," "sour stomach," probably are well along in an established pathology of the gall tract, or some other viscus in upper alimentary tube. These patients are numerous. They have many disquieting symptoms. They have mild and severe pains; they have gas eructations; "sour stomach;" nausea; loss of appetite; attacks of "biliousness;" sometimes jaundice; constipation; flatulence. The more severe grades of bile tract infection and dysfunction are characterized by chills and fever, and more active symptoms of a systemic nature. It is with a view to the brief consideration of these types of bile tract infection that our readers are asked to consider these comments.

The quantity of bile secreted daily varies from one to two pints. It is secreted continuously by the liver cells and flows through the biliary ducts to the common duct where the flow is obstructed by the sphincter. The gall-bladder is filled probably between periods of digestion. Ejection of bile into the duodenum takes place during the time of digestion. It is yellow to golden yellow in color. It is darker in color at times and sometimes is greenish. It is stimulated in quantity by any agent that causes hemolysis of the red corpuscles; it is increased in amount by bile itself; its flow is increased also by "secretion" or by the pancreatic "hormone."

Inflammation of the gall tract, including gall-bladder, cystic duct, common duct and biliary ducts, is very common, as above stated, and it is rather difficult to make a hard and fast differentiation between cholecystitis and cholangitis. Cholecystitis is usually accompanied by cholangitis. The inflammatory process in the mucosa results from the implantation and proliferation of bacteria. These microorganisms may reach the gall tract by two general routes. They may enter from the blood in such acute conditions as pyemia, septicemia, pneumococcus-emia, influenza, and from such chronic foci as tonsil and teeth infections. They may enter, also, by the alimentary route in such conditions as appendicitis, ulcerations in the intestines, typhoid fever and such like. The question whether the migrating organisms travel by the portal blood stream or by the hepatic artery is not settled; but it is probable that infection may reach the gall-



Drawing by Dr. John Brodnax, Department of Anatomy, Medical College of Virginia.

bladder and bile ducts by both avenues. Once there is an infection, there is set up a disturbance in the flow of bile, its ejection and retention in the bile ducts and gall-bladder. For many years in this infection the typhoid bacillus and colon bacillus were recognized as the most common and frequent offenders.

More recently, Rosenow's work in this connection is very interesting and should be considered as a noteworthy contribution to the etiology of cholecystitis. Rosenow has shown that the non-hemolytic streptococcus is a frequent cause of cholecystitis. Strains of this streptococcus from the tonsils appear to have a selective action for gall-bladder. The pneumococci may produce cholecystitis, seen not infrequently in pneumonitis, but sometimes without it. To these we may add the following organisms: Streptococcus haemolyticus, staphylococcus, Bacillus influenzae, and others. Implantations of bacteria set up forms of cholecystitis of various degrees of severity and pathology. But all forms, whether acute or chronic, have a beginning stage of more or less mildness, giving rise to quite mild disturbance of function or systemic symptoms.

Catarrhal Cholecystitis: In this initial gall-bladder disease one might note only microscopic leukocytic and lymphocytic changes while macroscopically the structures appear normal. But such microscopic change in the mucous membrane of gall-bladder and ducts is quite sufficient to set up disturbance in the flow of bile and in its constituents. As the mucous membrane assumes grosser pathology, the perversion of bile becomes more marked and deposition of cholesterin may be the beginning of the formation of stone. This acute non-suppurative cholecystitis causes thickening of mucosa and swelling of it, blocking the cystic duct, frequently. In acute non-suppurative cholecystitis, the onset may be sudden, entering the clinical picture as a part of a systemic disease. Such symptoms as pain, tenderness, rigidity of right rectus, are common. If obstruction occurs, the gall-bladder may be outlined by palpation. The patient usually exhibits jaundice, vomiting, rapid heart action, fever and leukocystitis.

Suppurative Cholecystitis: Acute suppurative cholecystitis is an advanced and progressive stage of what has just been briefly out-

lined. This type is usually associated with that degree of aggravation and chronicity as is found in gall-stones. The general symptoms are much the same, only more violent. The only treatment of this condition is surgical, unless the case is a poor surgical risk. In this case some advantage may be gotten for the patient by medical measures. One may readily recall the local clinical signs. They are much the same, while the constitutional symptoms are more marked. The facies of the patient is more significant of severe pathology; the pulse and fever increase in rate and degree; the spleen enlarges; the kidneys show signs of acute inflammation. The pancreas may, also, give evidence of associated pathology, with deep body pain, loose bowel movements, possibly with free fat. There may be glycosuria.

Chronic Cholecystitis: This form of gall tract infection is slow, insidious, and often is difficult to unearth—unless brought to the fore by an acute exacerbation. It is a progressive development of established catarrhal cholecystitis. In such cases the gall-gladder is often adherent to surrounding viscera and the mucous membrane is destroyed, being supplanted by cicatricial tissue, in the most aggravated forms. The infection and inflammatory processes are found to invade lymphatic system and involve the pancreas at its head. In such gall-bladder cases, the symptoms are characterized by recurrent attacks of pain. This pain of biliary colic is usually caused by the presence of gall-stones. Gall-bladder attacks of pain may occur without gall-stones, however. Adhesions and chronic changes in the gall-bladder set up a gastric syndrome in which pain is no inconsiderable feature, although other symptoms of stomach disorder are found, such as gas eructation, pyrosis, epigastric oppression, nausea, and constipation. The gastric secretory function as well as the gastric motor function are decidedly at fault in this form of gall-bladder disease. In addition one may expect associated systemic disturbances, such as multiple arthritis, neuritis, myocarditis, nephritis, and high blood pressure signs.

Pericholecystitis: The peritoneum covering the gall may become involved in the pathology.

Acute inflammation of peritoneum results from extension of virulent infection within the viscus. It may occur also from perforating gastric ulcer. The chronic adhesions in this region result from recurrent cholecystitis with or without gall-stones. This condition may set up complications in the intestines by formation of a kink or constriction. The gall-bladder area of pain at the right of the spinal column, between seventh and tenth ribs, is thought to bespeak pericholecystitis with adhesions.

Catarrhal Jaundice: This may result from gastro-intestinal disturbances, such as occur from indigestion of food, acute poisons, acute infections, acute duodenitis. The swelling of the mucosa of duodenum, in the region of the biliary papilla, may produce some occlusion of the bile duct; jaundice results. Acute pancreatitis may also produce catarrhal jaundice by compression on common duct. This and other conditions may produce catarrhal jaundice. One would feel that all such cases are due to a microbic infection, although no specific organism has been found.

This condition is more often met with in the young. Its onset is gradual, usually following some definite gastro-intestinal disturbance. There occurs icterus in the sclera; jaundice of face, extremities and trunk follow. The temperature is moderate and the pulse is slow. There are the dry, clay-color-stools. The urine shows bile pigment. In severe forms, pancreatitis, nephritis, hepatitis may occur, with clinical evidence.

Suppurative Cholangitis: This is also of microbic origin. The bacillus coli, bacillus typhosus and paratyphosus, streptococcus, staphylococcus, pneumococcus are the common causes of cholangitis. One must not forget Rosenow's work on the selective action of organisms, found in chronic disease of tonsils and teeth, for the gall tract.

The gall tract, composed of the common duct, intrahepatic and cystic ducts, is affected. The gall-bladder may be and usually is involved. The ducts are dilated, their walls are infiltrated. The liver is enlarged; hepatitis exists; abscess formation may follow. Infection, traveling by lymphatics, or by continuity, may involve the duct of Wirsung and other adjacent structures. The symptoms are consonant with the pathology. Rigors, sweats, septic range of temperature, prostration, nausea, vomiting, diarrhea, jaundice, pain, enlarged liver, enlarged spleen, distended abdomen, make up a partial list of symptoms found.*

*Reference: Oxford Medicine, Vol. III, Chapter VII.

News Notes

The Seaboard Medical Association of Virginia and North Carolina

Held its twenty-eighth annual meeting in Newport News, Va., December 4, 5 and 6, under the presidency of Dr. Joseph T. Buxton, of that city. The attendance was large. This with the discussion of each and every paper, and two well attended public meetings—one on Medical Education and Health Officers' Training and the other on Child Welfare—made the meeting a phenomenal success.

A resolution was passed memorializing the Legislatures of Virginia and North Carolina to be as liberal to the Departments of Health, as the funds of the respective states will permit, especially continuing venereal disease control, which is distinctly constructive work in the Health Departments of both States. A committee was appointed to co-operate with the Walter Reed Medical Society and the Medical Society of Virginia in the matter of the "Walter Reed Memorial."

Rocky Mount, N. C., was selected as the place of meeting in December, 1924, and the following officers were elected: President, Dr. William E. Warren, Williamston, N. C.; vice-presidents, Dr. James W. Hunter, Norfolk, Va., Dr. George A. Caton, New Bern, N. C., Dr. Robert A. Davis, Newport News, Va., and Dr. B. C. Willis, Rocky Mount, N. C.; secretary, Dr. Clarence Porter Jones, Newport News, Va., and treasurer, Dr. George A. Caton, New Bern, N. C., both of the latter being re-elected.

CLARENCE PORTER JONES, *Secretary.*

The Tri-State Medical Association of the Carolinas and Virginia

Will hold its twenty-sixth annual session in Greenville, South Carolina, on Wednesday and Thursday, February 20-21, 1924. The Imperial Hotel will be headquarters of the Association. A session will be held morning and afternoon and also on the evening of the twentieth. Only forty titles may be placed on the program and the five sessions will give ample time for each paper to be read and discussed. The Association will meet in a single section.

It is hoped that the usual preliminary exercises may be entirely dispensed with and that immediately after the Association has been called to order the reading of the pages may begin.

The physicians of Greenville have been requested not to attempt to provide entertainments of any kind. The real business of this organization is the diffusion of medical knowledge and the entire time of the meeting will be devoted to that purpose. The Association is not interested as a body in medical or other policies, but its purpose is to make better doctors of its members.

The program is being rapidly formulated and every indication points to a splendid meeting. Four or five invited guests will address the Association.

Dr. Chas. O'H. Laughinghouse, Greenville, N. C., is president; Dr. W. L. Peple, Richmond, Dr. D. A. Stanton, High Point, N. C., and Dr. S. B. Sherard, Gaffney, S. C., vice-presidents; and Dr. James K. Hall, Richmond, secretary-treasurer. Dr. L. O. Mauldin, Greenville, S. C., is chairman of the local committee of arrangements.

Dr. William F. Drewry,

For the past twenty-five years superintendent of Central State Hospital, Petersburg, Va., and one of the best known psychiatrists in the country, has resigned his connection with the State Hospital and accepted the position of city manager of Petersburg, at a salary of $10,000 a year. He entered upon his new duties on January 8.

It was with a feeling of regret that we first learned of the fact that Dr. Drewry was severing his connection with a work in which he has excelled. However, in his new position, he has undoubtedly entered a field in which he will have broader scope for his excellent talents and it is a pleasure to learn from him personally that he expects to maintain his interest in all things medical—and especially in this his native State. Editorials in our leading dailies have paid high tribute to Dr. Drewry and the great service he has rendered Virginia.

Petersburg is to be congratulated upon her selection of city manager and this Journal extends Dr. Drewry its best wishes for his continued success in his new work.

The Seaboard Air Line Railway Surgeons

Held their annual meeting on board steamship Governor Cobb, en route to Cuba, December 4, Dr. H. H. Bass, Henderson, N. C., sec-

ond vice-president, presiding. At the annual banquet held on the following evening on the roof garden of Plaza Hotel, Habana, the chief surgeon, Dr. Jos. M. Burke, Petersburg, Va., presided as toastmaster. On December 8, on board the steamship Cuba, returning home, the last session of the convention was held. Special resolutions were passed on the death of Dr. R. B. Epting, Greenwood, S. C., who died February 18, 1923, shortly after his election to the presidency of the Association. Dr. Joseph M. Burke, chief surgeon, was presented a handsome 23 jewel Harvard watch and gold chain as a token of affection from the members.

Sarasota, Fla., was selected as the next place of meeting. The following officers were elected for the ensuing year: President, Dr. H. H. Bass, Henderson, N. C.; vice-presidents, Dr. Jack Halton, Sarasota, Fla., Dr. B. J. Witherspoon, Charlotte, N. C., and Dr. T. M. McDuffee, Manatee, Fla.; member of executive council, Dr. Edward T. O'Connell, Birmingham, Ala. Dr. J. W. Palmer, Ailey, Ga., was re-elected secretary-treasurer.

Dr. Turner S. Shelton

Has been elected a member of the executive committee of the South Richmond Post, No. 187, American Legion.

Members of Nottoway Red Cross Board.

Dr. W. W. Bennett, Blackstone, and Dr. H. G. Carter, Burkeville, have been elected members of the executive committee of the Red Cross Chapter of Nottoway County, Va.

Major Alfred P. Upshur, M. C.,

Of Fort Sam Houston, Texas, spent the holidays with his parents, Dr. and Mrs. J. N. Upshur in Richmond.

Dr. Charles M. Caravati,

Of the class of '22, Medical College of Virginia, returned to Richmond, January 1, after having served as resident interne at Providence Hospital, Washington, D. C., for eighteen months. He is engaged in the general practice of medicine, with offices at 917 Park Ave.

Dr. Dean B. Cole

Announces the opening of offices in Suite 503, Medical Arts Building, Richmond, Va. His practice will be limited to diseases of the chest.

Dr. M. L. Dalton,

Formerly of Floyd, Va., but who is now living in Hinton, W. Va., has just returned from New York City, where he spent several weeks in post-graduate work at the N. Y. Post-Graduate Medical School and Hospital.

It is interesting to note that Dr Herbert C. Chase, of the class of '10, former University College of Medicine, Richmond, Va., is director in charge of the Medical Department of this school.

Dr. G. R. Faircloth,

Williamsville, Va., is taking up special work in urology at Brady Urological Institute, Johns Hopkins Hospital, Baltimore, Md.

Dr. D. M. Thomasson

Returned to his home in Lynchburg, Va., the first of December, after taking a special course at the New York Post-Graduate Hospital.

The American Congress on Internal Medicine

Will hold its eighth annual clinical session in the amphitheatres, wards and laboratories of the various institutions concerned with medical teaching, at St. Louis, Mo., beginning Monday, February 18, 1924.

Practitioners and laboratory workers interested in the progress of scientific, clinical and research medicine are invited to take advantage of the opportunities afforded by this session.

Address inquiries to the secretary-general, Dr. Frank Smithies, 1002 North Dearborn Street, Chicago, Ill. Dr. Elsworth S. Smith, St. Louis, Mo., is president of the Congress.

Officers in American Legion.

Dr. E. C. Levy has been elected vice-commander, and Dr. J. B. Bullard a member of the executive committee of the Richmond (Va.) Post No. 1, American Legion, for the coming year.

Dr. W. J. Crittenden,

Orange, Va., is spending some time in New York.

Dr. and Mrs. S. M. Yancey,

Harrisonburg, Va., have gone to Lakeland, Fla., where they expect to spend the winter with their children.

Dr. B. M. Rosebro,

Richmond, recently visited Dr. H. B. Melvin, who has been sick at his home in Halifax, Va.

Dr. R. L. Kern,

Of this city, who has been quite ill from blood poisoning, is now much better.

Married.

Dr. George Blight Harrison, Fredericksburg, Va., and Miss Florence Kimbrough Jackson, Lynchburg, Va., December 15.

Dr. Archer A. Wilson, Oxford, N. C., and Miss Amorette E. Barker, Richmond, Va., December. Dr. Wilson was a member of the class of '23, Medical College of Virginia.

Dr. Cyrus E. Hawks and Miss Dorthy Ellen Arnold, both of Richmond, December 7. Dr. Hawks was formerly connected with Catawba Sanatorium, Va., but is now located at Pine Camp, Richmond.

Dr. Hugh C. Henry,

Since 1911 first assistant superintendent at Central State Hospital, Petersburg, Va., has been appointed superintendent of that institution to succeed Dr. William F. Drewry, resigned. Dr. Henry is a native of Charlotte County, Virginia, and a graduate of the Medical College of Virginia. He has been connected with the hospital since 1903 and is recognized as one of the leading alienists of the South.

Dr. Charles M. Edwards,

Richmond, Va., who served in the medical corps of the Army, in the World War, as director of physio-therapy at several army posts, has received an appointment as major in the Officers' Reserve Corps.

A National Conference on Civilian Vocational Rehabilitation

Will be held in Washington, D. C., February 4-8, 1924. Speakers of national prominence from the fields of social work, industrial management, organized labor, and officials actually in charge of rehabilitation in the States, are to address this conference.

The vocational rehabilitation of disabled civilians represents one of the outstanding accomplishments in social, educational, and labor progress of recent years. For over three years, thirty-six states, co-operating with the Federal Government, have maintained an organization for the rehabilitation of those who are vocationally handicapped from accident or disease.

Dr. S. W. Budd,

Richmond, has been elected president of the Virginia Kennel Club, for the ensuing year.

Dr. R. F. Thornhill,

Of Pulaski, recently visited his old home in Culpeper, Va.

Dr. and Mrs. S. W. Brewer

Have returned to their home at Singer Glen, Va., after a visit to Richmond.

"Swat the Quack."

In consequence of the unpleasant publicity which has recently come to some states from improper licensing of doctors, "swat the quack" crusades are being commenced. Texas and New York, it is announced, have both entered upon campaigns to weed out the fakirs and undesirables. Medical Practice Acts have been sufficiently stringent in some states, to keep out many physicians with bogus diplomas and those in other ways unfit for the high calling of medicine. However, this will be a good time for "house cleaning" everywhere.

Dr. Robert S. Carroll,

Medical director of Highland Hospital, Asheville, N. C., is spending a year traveling and studying in Europe and the Orient.

Dr. R. L. Raiford,

Sedley, Va., is spending the winter in New York City, taking a course in eye, ear, nose and throat work.

Dr. George T. Divers

Has recently moved into his new hospital at Stuart, Va. This hospital, which will accommodate about fifty patients, has been made modern in every respect.

Dr. Florence E. Kraker,

Philadelphia, who has just returned from a year in China where she was on the teaching staff of the Margaret Williamson Hospital, at Shanghai, has been appointed specialist in maternal hygiene in the Children's Bureau of the U. S. Department of Labor. Dr. Kraker was for sixteen years a member of the teaching staff of the maternity department of the Woman's Medical College of Philadelphia, during the latter years of her work there being professor of clinical obstetrics.

Dr. A. R. Gray,

Bentonville, Va., who has been quite sick for the past four months is now able to be out again.

1922 Death Rates.

The Department of Commerce, through compilations made by the Bureau of the Census, announces that the mortality rate for the registration area in 1922 was 11.8 per 100,000 population against 11.6 in 1921. Virginia was

one of the six States showing a lower rate for 1922 than for 1921.

In the registration area of the United States, it was shown that there was a decrease in number of deaths from tuberculosis, in deaths of mothers from childbirth or puerperal causes, and in deaths from typhoid fever. In fact, the rate for deaths from typhoid fever was the lowest ever shown for the registration area. There was an increase in the number of deaths from diabetes and cancer.

Staunton Kiwanians Honor Doctors.

The committee of tellers of the Staunton, Va., Kiwanis Club, although not required to do so by the constitution and by-laws, in the recent election of officers declared among others, the election of Dr. T. M. Parkins as poet and Dr. Guy R. Fisher as artist.

Sir Auckland Geddes Resigns.

Sir Auckland Geddes, British ambassador at Washington, has resigned his post, due to bad health, and will not return to America. As a physician and a man interested in scientific research, he has made many friends among American physicians who will regret to note his retirement.

Fire at Insane Hospital in Chicago.

On the night of December 26, fire destroyed a frame structure used for tubercular patients at the Chicago State Hospital, at Dunning, and seventeen patients were burned to death or suffocated. The financial loss was estimated to be $100,000.

The Southern Surgical Association

Held its annual meeting at White Sulphur Springs, W. Va., the middle of December, under the presidency of Dr. James F. Mitchell, of Washington, D. C. It was decided to hold the next meeting in Charleston, S. C., December 9, 10 and 11, 1924. The following officers were elected: President, Dr. Le Grand Guerry, Columbia, S. C.; vice-presidents, Dr. J. M. Mason, Birmingham, Ala., and Dr. John T. Moore, Houston, Tex.; secretary, Dr. H. A. Royster, Raleigh, N. C., and treasurer, Dr. Urban Maes, New Orleans, La. Both of the latter held over on unexpired terms.

Virginia Doctor Honored.

We are much interested to note that, at the recent meeting of the Southern Medical Association in Washington, D. C., Dr. A. I. Dodson, of St. Elizabeth's Hospital, Richmond, received one of the three awards made for scientific exhibits. It is especially notable that Dr. Dodson was the only individual to whom an award was given, the other two recipients of awards being the Department of Pathology of the Medical School of Vanderbilt University, Nashville, Tenn., and the Medical Department of the U. S. Army, through the Army Medical Museum.

Dr. Dodson is to be congratulated on his achievement, and especially in view of the fact that there were a number of scientific exhibits, many of them of a very high character.

The American Association for the Study of Goiter

Is to hold its annual meeting January 22, 24 and 25, at Bloomington, Ill., under the presidency of Dr. E. P. Sloan, of that city. Dr. J. D. Moschelle, Odd Fellows Building, Indianapolis, Ind., is secretary of the Association. Operative clinics will be held in connection with the meeting.

The primary object of this Association is to bring together each year men who will present the best that has been "thought, said and done" about goiter and its associated problems. Members of all State medical societies are invited to attend this meeting.

Dr. Swanson Loses Home by Fire.

The home of Dr. W. T. Swanson, in Pittsylvania County, Virginia, was destroyed by fire on the night of December 16, practically everything in it being lost.

Dr. Frederick Gochnauer,

Upperville, Va., was elected adjutant of the Dr. Thomas Lee Settle Camp, C. S. V., at their annual meeting held in Upperville, the last of December.

Dr. Chas. J. Terrell,

Hewlett, Va., left in December for Orlando, Fla., in which place he expects to spend several months.

Dr. Wyatt S. Beazley, Jr.,

A member of the class of '23, Medical College of Virginia, who is now one of the resident internes at St. Francis Hospital, Jersey City, N. J., spent the Christmas holidays with his parents, Dr. and Mrs. W. S. Beazley, in Richmond.

Dr. Sidney L. Scott,

Fredericksburg, Va., was recently elected president of the Kiwanis Club of that place, for the ensuing year.

Dr. and Mrs. T. N. Davis,

Lynchburg, Va., were among the Christmas visitors in Richmond, having come to visit Mrs. Davis' parents.

Dr. R. W. Paul,

Richmond, who has been taking post-graduate work in New York City, returned home for the holidays and later left for Rochester, Minn., where he will take up further work in surgery.

Officers in American Legion at Warrenton.

Dr. Howard Fletcher, Warrenton, has been elected vice-post commander and Dr. W. G. Trow, also of Warrenton, a member of the executive committee of the John D. Sudduth Post, American Legion, for the coming year.

Wise County Active Against Rabies.

As there have been an unusually large number of rabid dogs in Wise County, Virginia, this year, the board of health of that county has decided to end the "mad dog" danger in that county, by not permitting any dog to run at large in the county unless a reputable physician will certify that he has given canine vaccine to the animal. Any dog found running at large shall be killed or confined at the discretion of the county health officer; every rabid dog shall be killed, and every dog suspected of being rabid shall be killed or confined for observation, at the discretion of the health officer.

Dr. and Mrs. Vaden L. McCullers,

Of Locust Dale, Va., were recent visitors in Charlottesville, Va.

Richmond Dental Society.

At the annual meeting of this Society in December, Dr. C. Browne Pearson was elected president and Dr. John C. Tyree, secretary-treasurer, for the coming year.

The Church Hill Medical Society,

Richmond, Va., at their regular meeting in December, elected the following officers for the ensuing year: President, Dr. A. S. Lilly; vice-president, Dr. S. M. Cottrell; secretary-treasurer, Dr. R. S. Faris; librarian, Dr. B. L. Phillips; reporter, Dr. Ramon D. Garcin. Of these officers, Drs. Lilly, Faris and Garcin were re-elected. The Society met at the home of Dr. F. P. Fletcher. After the business session and the reading of a paper by Dr. Marshall L. Boyle on "Malnutrition in Children," supper was served those present.

Dr. William A. Smith,

Haywood, Va., has been named sub-chairman to have charge of the $3,000,000 Harding memorial campaign in Madison County, Virginia.

Dr. Carrington Williams,

Richmond, first vice-president of the Civitan Club of this city, has been made president, succeeding Alexander Forward, resigned.

Dr. William T. Green, Jr.,

A member of the class of '20, Medical College of Virginia and recently house surgeon at Bellevue Hospital, New York City, announces opening of his office at 337 New Monroe Building, Norfolk, Va. His practice will be limited to diseases of the ear, nose and throat.

Dr. and Mrs. Powhatan Moncure,

Bealeton, Va., are spending some time visiting a daughter at Chevy Chase, D. C.

The Blue Slip

In this issue of the journal should have your attention, as it means a saving to the Society, of which you are part owner. Look for it and give it your attention, won't you?

The new year starts with this issue of the journal. Let's make it a good one.

Corrected Dates for A. M. A. Meeting.

Since it has been found that the Republican National Convention will not be held in Chicago, the Board of Trustees of the American Medical Association has rearranged the dates for the Chicago meeting, and states that they will be June 9-13, inclusive, instead of in May, as previously announced.

Dr. Gordon Wilson,

Baltimore, Md., at the December 7th meeting of the Baltimore City Medical Society, was elected president of the Society for the ensuing year.

Sir Frederick Treves,

The celebrated English surgeon, died at Lausanne, Switzerland, December 9, at the age of 70 years.

Income Tax Time Again.

All of our readers are now so familiar with the "Who, When, Where, How, and What" of this tax, that all necessary should be the reminder that March 15, 1924, is the last date for filing this return and making at least a first payment. Secure your tax form from collector of internal revenue for district in which you live. You are liable to penalty for failure to make a return within the specified time.

The Annual Report of the Surgeon General of the U. S. Navy

Covers the fiscal year ending June 30, 1923. The various activities of the Medical Department show that the professional work has been of a high standard and the naval hospitals are in excellent condition. At the close of the year, the strength of the medical corps was 757. Health conditions in general were better than the average, compared with figures of the preceding five years. The death rate was the lowest in the history of the Navy.

As in the past, the Medical Department of the Navy reports difficulty in securing desirable acquisitions to the commissioned personnel, as well as to the Nurse Corps and Hospital Corps.

Tribute to Whom Tribute is Due.

Have you looked over the advertisements? Our advertisers favor us and look to you for patronage. They are all A-1.

Obituary

Dr. Edgar Waples Robertson,

One of the best known and most beloved physicians of the Eastern Shore, died at his home in Onancock, Va., December 11, after an illness of several weeks. He was born in Kingston, Md., October 2, 1845, but had lived in Onancock since a young child. Upon completion of his academic education, he studied medicine at the University of Maryland, from which he graduated in 1866, and at once took up the practice of medicine at Onancock, continuing active in his work until his illness this Fall. Dr. Robertson had endeared himself to the people in that section as only an old-time family physician can do and worked for all that pertained to the progress of his community. He was a member of the Medical Society of Virginia, a fellow of the American Medical Association, and a member and ex-president of the Accomac County Medical Society. In addition to his interest in his profession, Dr. Robertson was an active and enthusiastic member of the Baptist Church.

Surviving him are three sons, one of them being Dr. John W. Robertson, of Onancock.

Dr. Albert Chapman Lancaster,

Of Martinsville, Va., for many years a prominent physician of Henry County, died in a Roanoke hospital, December 30. He had been suffering for some time from a complication of diseases. Dr. Lancaster was born in Floyd County, Virginia, 48 years ago, and studied medicine at the University of the South, Sewanee, Tenn., from which he graduated in 1900. He practiced in Patrick County, Virginia before moving to Martinsville, and also served in the medical corps of the army in the World War. Dr. Lancaster was a member of the Medical Society of Virginia and a fellow of the American Medical Association. Interment was made in Roanoke. He is survived by a brother.

Dr. Frank Waters Hains,

Formerly of Petersburg, Va., and for many years a member of the Medical Society of Virginia, died in Key West, Fla., December 30, at the age of fifty-nine years. He was on his way to Petersburg from Sebring, Fla., where he had been for his health, when he became ill and was taken to a Key West hospital where he later died. He had suffered for many years with heart trouble. Dr. Haines was a graduate in medicine from the University of Maryland in 1888 and had been a member of the Medical Society of Virginia since 1894.

Dr. George Torian,

Of Brookneal, Va., died December 15, in Lynchburg, death being due to blood poisoning. He was sixty-three years of age. Dr. Torian graduated from the Medical College of Virginia in 1881 and had practiced medicine for many years in Campbell County, Virginia. He is survived by his wife and six children.

Dr. Fielding Lewis Ashton.

News was received December 19 of Dr. Ashton's death in Seattle, Wash., where he had made his home for ten or twelve years and was specializing in urology. Dr. Ashton was a native of King George County, Virginia, and forty-two years of age. He studied medicine at the University College of Medicine, Richmond, from which he graduated in 1905. He is survived by his wife, formerly of Fredericksburg, Va., and two sisters.

Dr. Elijah Brodie Meadows,

Of Oxford, N. C., died December 2, following a long illness. Dr. Meadows was forty-eight years of age and had studied medicine at University College of Medicine, Richmond, from which he graduated in 1901.